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Merrill et al.

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(45) **Date of Patent: Jul. 28, 2015**

(54) **DIVERSITY NETWORKS AND METHODS FOR SECURE COMMUNICATIONS**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 566 days.

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(22) Filed: **Sep. 8, 2010**

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(51) **Int. Cl.**
G06F 15/173 (2006.01)
G08B 25/00 (2006.01)
G08B 25/01 (2006.01)
G08B 25/08 (2006.01)

(52) **U.S. Cl.**
CPC ***G08B 25/004*** (2013.01); ***G08B 25/00*** (2013.01); ***G08B 25/01*** (2013.01); ***G08B 25/08*** (2013.01)

(58) **Field of Classification Search**
CPC G08B 25/004; G08B 25/00; G08B 25/01; G08B 25/08
See application file for complete search history.

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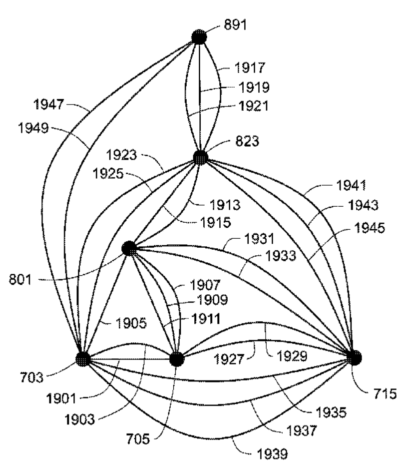
(Continued)

Primary Examiner — Patrice Winder
Assistant Examiner — Nam Tran
(74) *Attorney, Agent, or Firm* — Barclay J. Tullis

(57) **ABSTRACT**

Security systems may include sensing, networked communications, stealth, alarms, and countermeasures, any or all of which may adapt to threats. These systems may also include armor and barriers of concrete and/or steel. They can adapt to severity of threats, weather, and/or other situational aspects. They can anticipate at least some threats in order to obtain early warning and react more quickly to those threats. They can adapt by altering their configurations, including alterations in communication networking structures and methods, and changes in data-storage and processing duties at processing nodes. Defensive and/or offensive countermeasures can be employed to deter, confuse, trap, and/or disable terrorists. The systems are capable of self-maintenance, self-healing, and self-restoration as threats subside. The systems can include subsystems capable of autonomous operation. At least some of the systems and/or their subsystems are capable of allocating power among subsystems, and of regulating bandwidth utilizations.

27 Claims, 14 Drawing Sheets



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Pending U.S. Appl. No. 61/325,157, filed Apr. 16, 2010 by Charles Merrill, Kevin Charles Kriegel, Allen Roger Nolte, Barclay J. Tullis and titled "Security Systems Having Armored, Sensory, Adaptive, Stealthy, and/or Autonomous Means".

U.S. Appl. No. 12/877,670, filed Sep. 8, 2010 by Charles Merrill, Kevin Charles Kriegel, Allen Roger Nolte, Barclay J. Tullis and titled "Security Systems Having Communication Paths in Tunnels of Barrier Modules and Armored Building Modules".

U.S. Appl. No. 12/877,728, filed Sep. 8, 2010 by Charles Merrill, Kevin Charles Kriegel, Allen Roger Nolte, Barclay J. Tullis and titled "Security Systems with Adaptive Subsystems Networked through Barrier Modules and Armored Building Modules".

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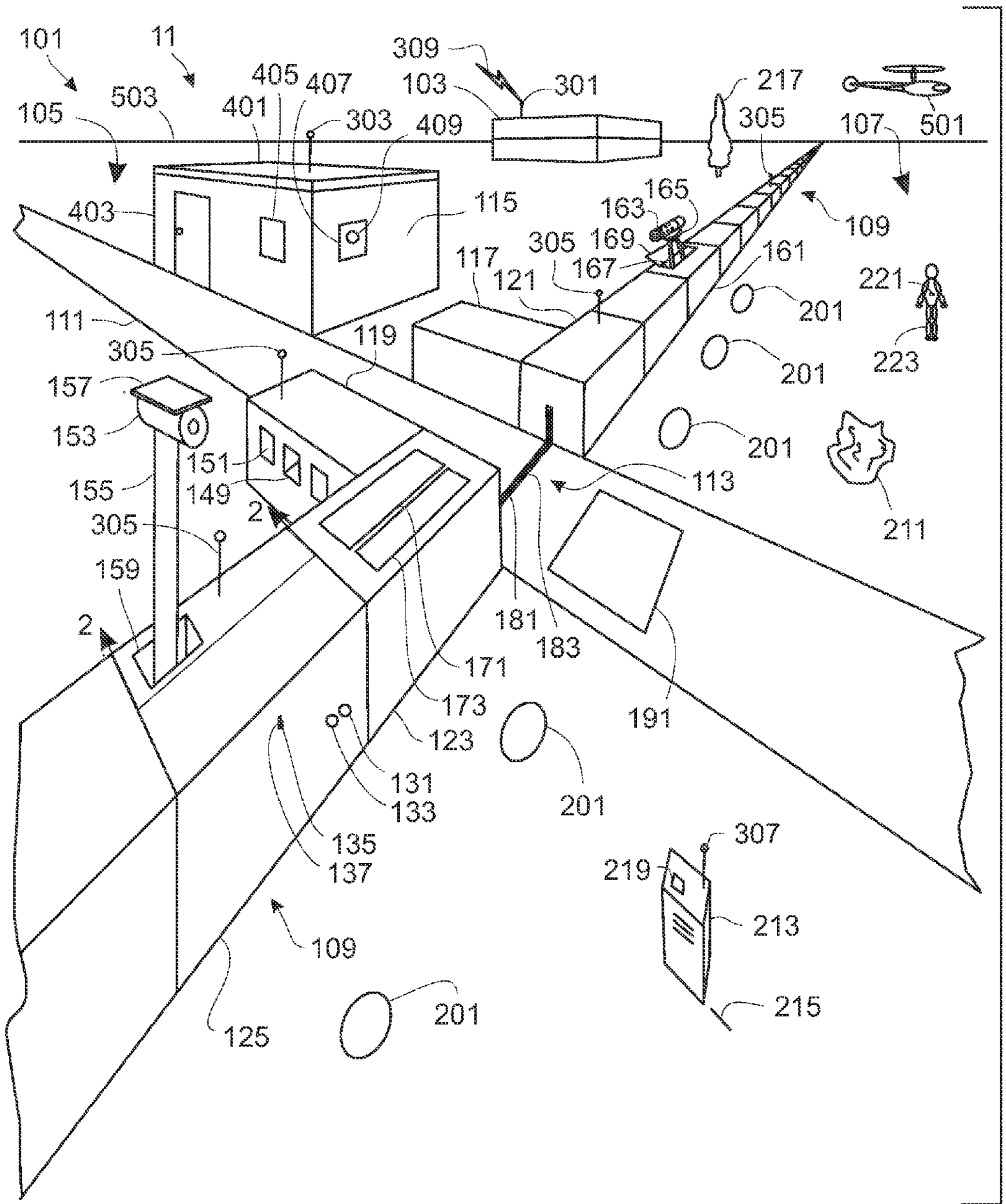
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305
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FIG. 1

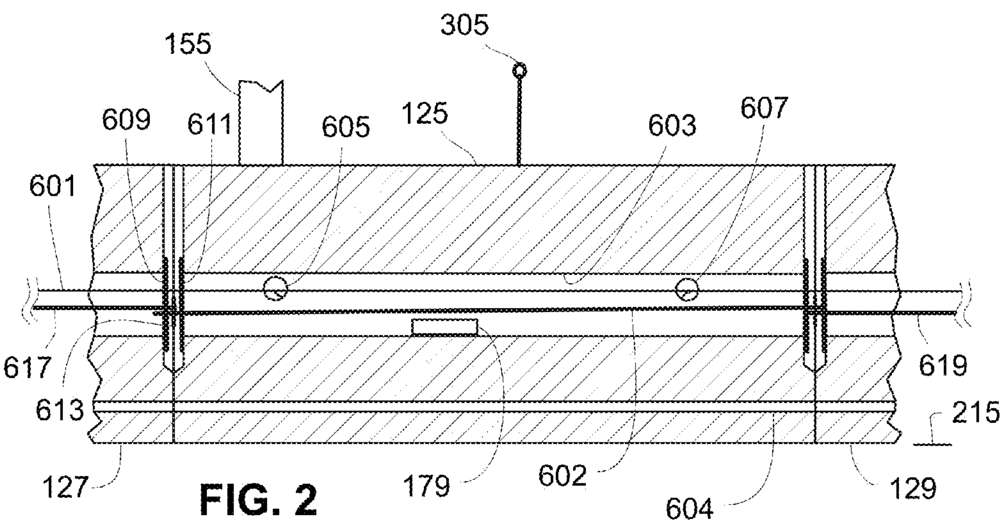
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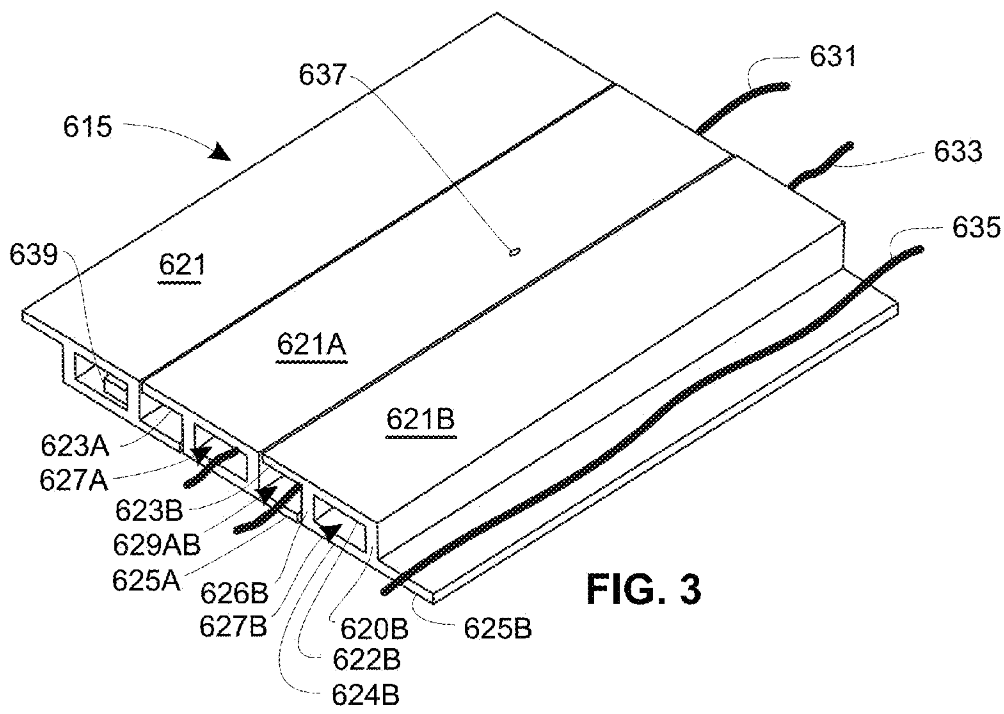
FIG. 2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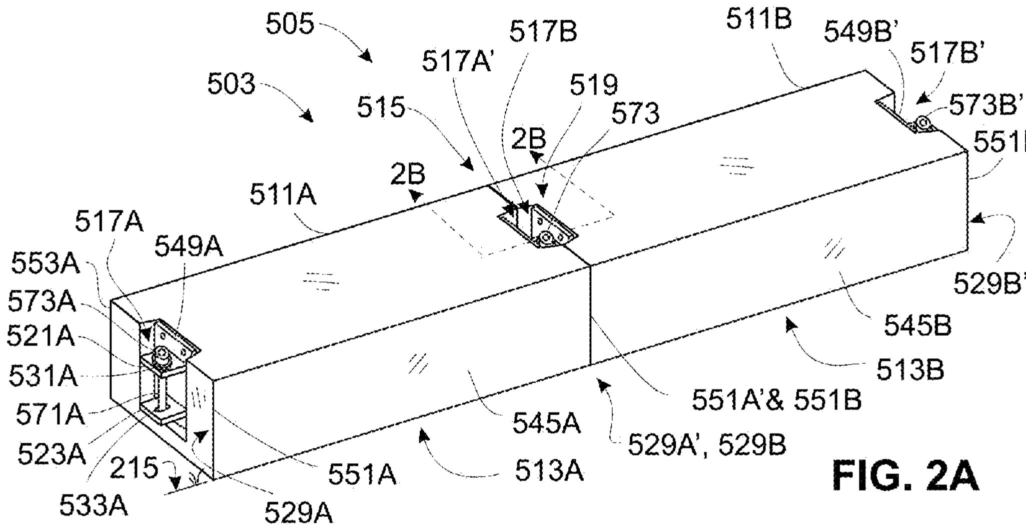
627B
620B
622B
624B
625B

FIG. 3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503
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517A'
517B
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573
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2B
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511B
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573B'
551B'
517A
549A
553A
573A
521A
531A
571A
523A
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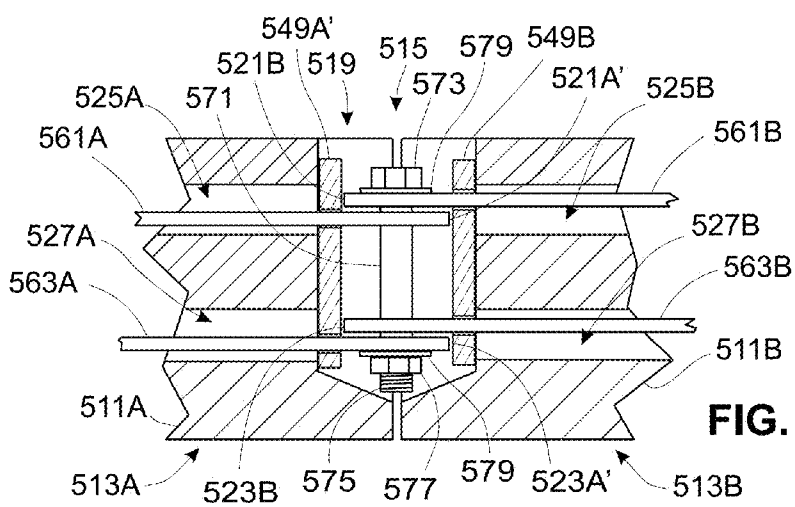
513A
529A', 529B
551A'& 551B
513B
545B
529B'

FIG. 2A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571
525B
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563B
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511A
513A
523B
575
577
579
523A'
513B

FIG. 2B

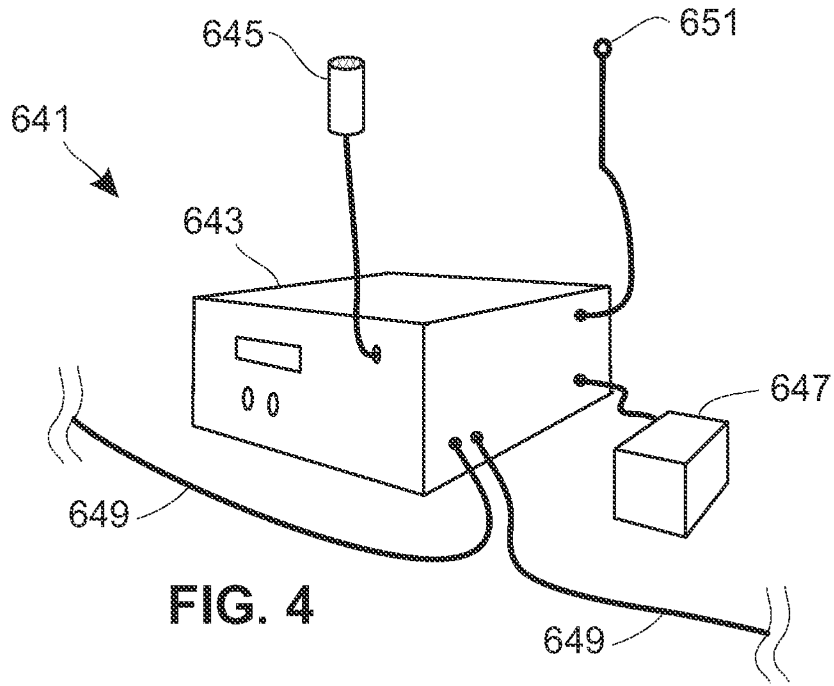
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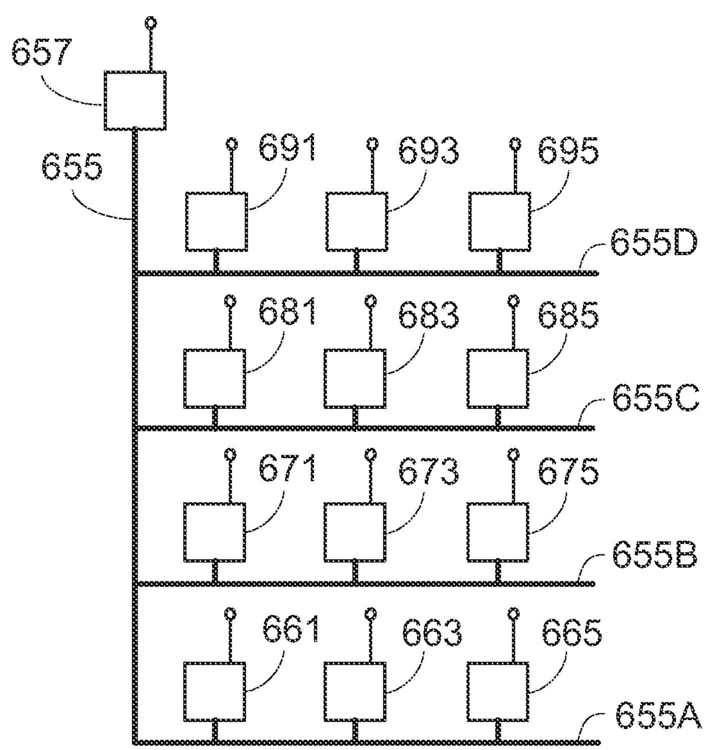
FIG. 4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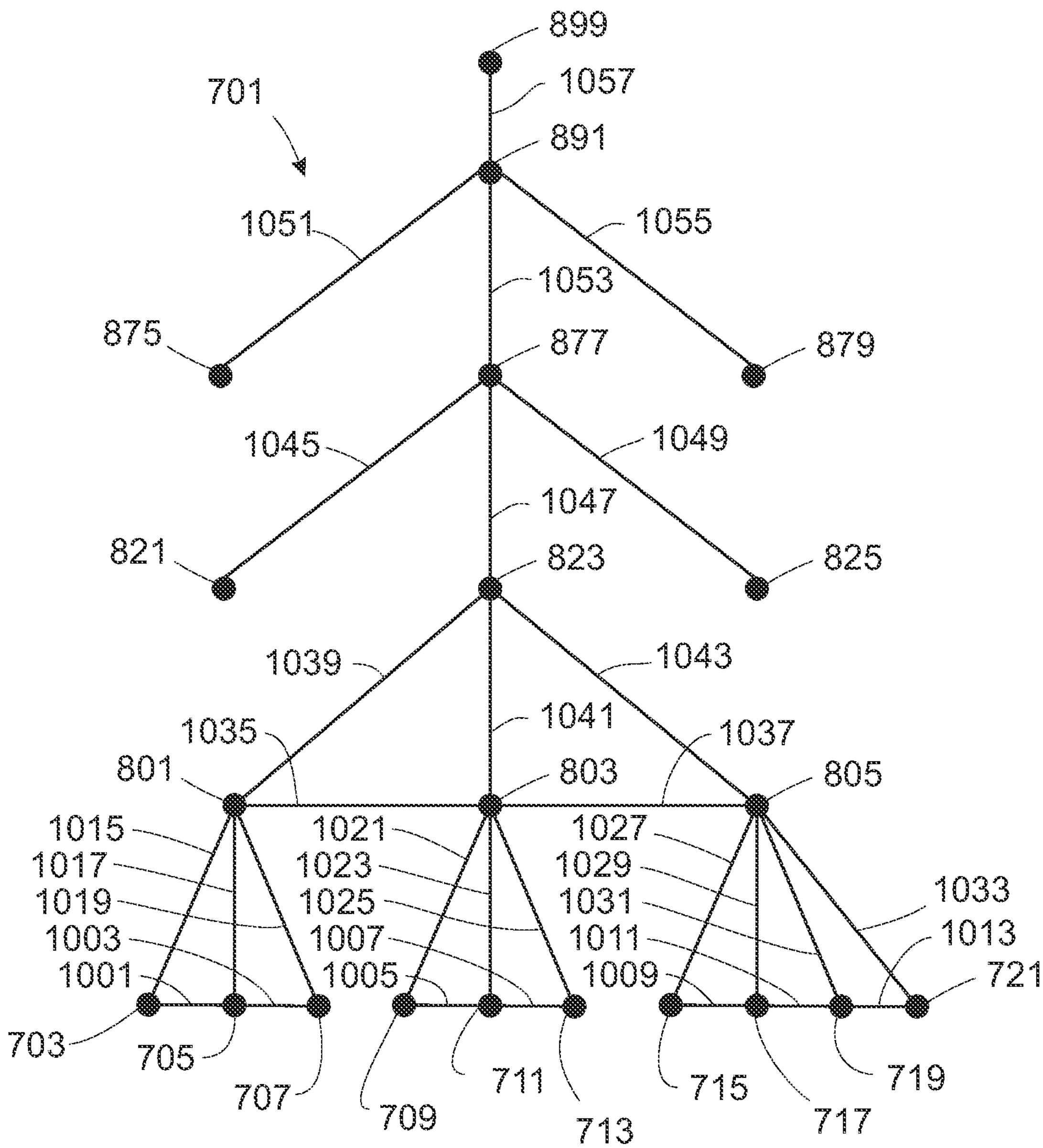
655A

FIG. 5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1041
1035
1037
801
803
805
1015
1017
1019
1003
1001
1021
1023
1025
1007
1005
1027
1029
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1009
1033
1013
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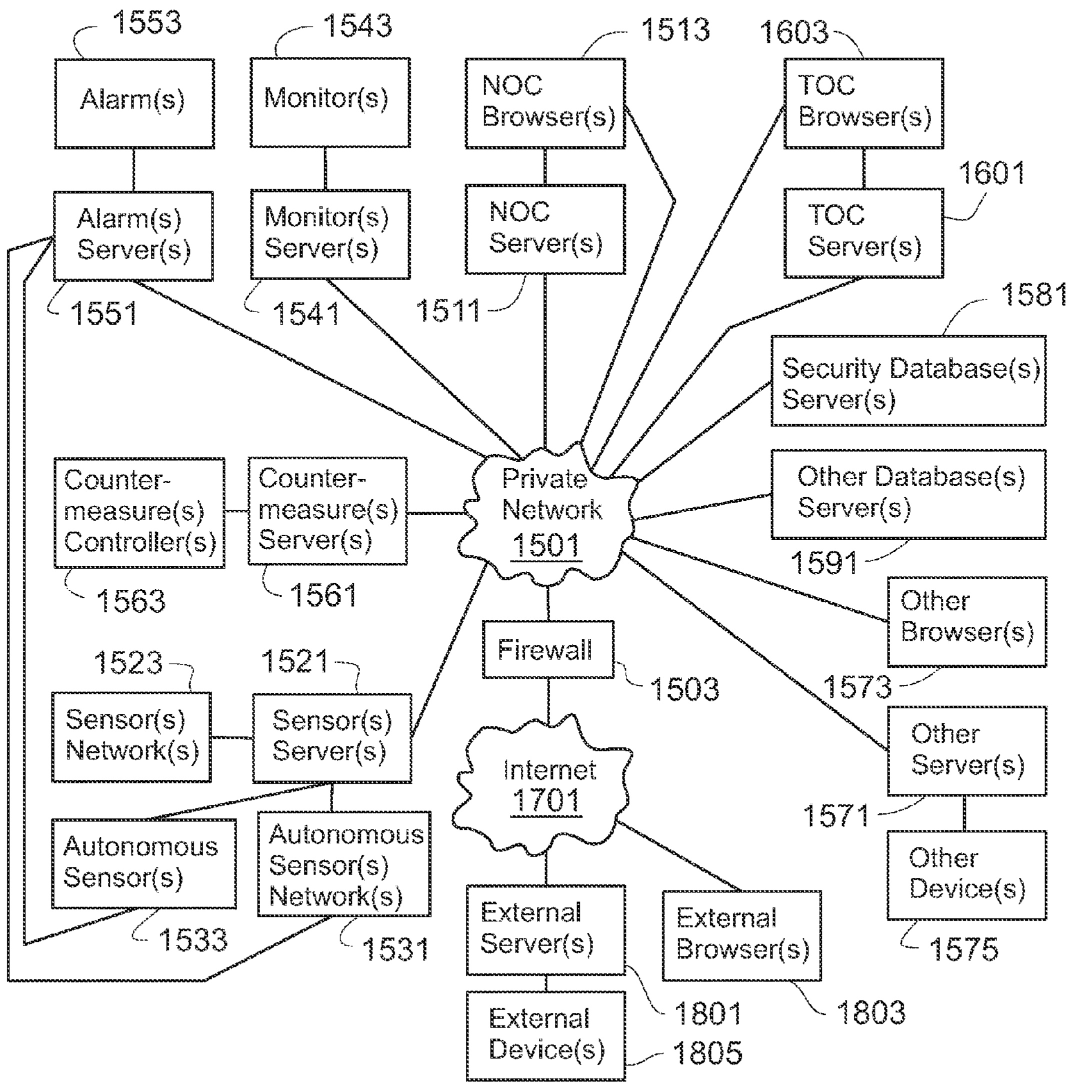
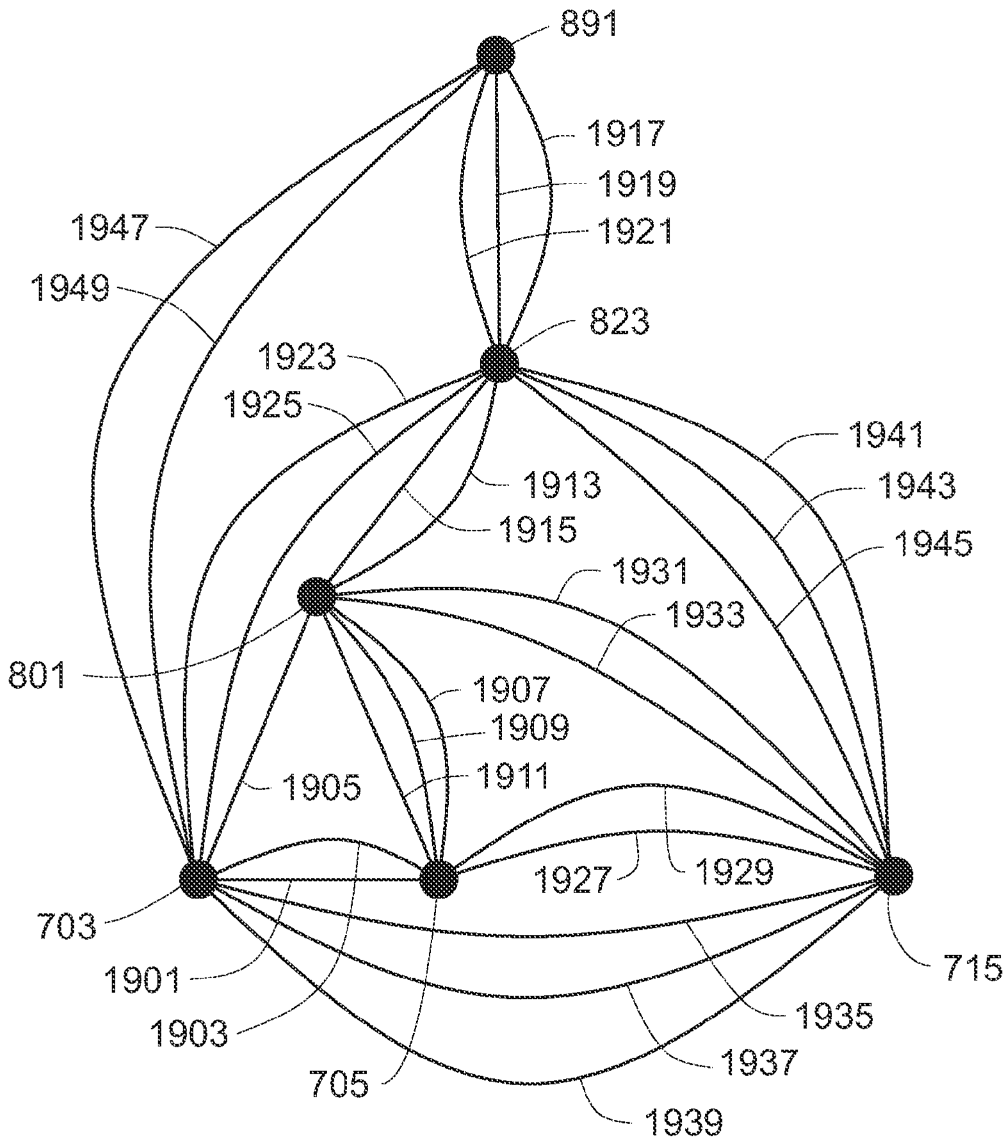
717
719

FIG. 6



1553
Alarm(s)
1543
Monitor(s)
NOC Browser(s)
1513
1603
TOC Browser(s)
Alarm(s) Server(s)
Monitor(s) Server(s)
NOC Server(s)
1601
TOC Server(s)
1551
1541
1511
1581
Security Database(s) Server(s)
Counter-measure(s) Controller(s)
Counter-measure(s) Server(s)
Private Network
1501
Other Database(s) Server(s)
1591
1563
1561
Other Browser(s)
1523
1521
Firewall
1503
1573
Sensor(s) Network(s)
Sensor(s) Server(s)
Internet
1701
Other Server(s)
1571
Autonomous Sensor(s)
Autonomous Sensor(s) Network(s)
Other Device(s)
External Server(s)
External Browser(s)
1533
1531
1575
1801
1803
External Device(s)
1805

FIG. 7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1911
1905
1927
1929
703
1901
1903
705
715
1935
1937
1939

FIG. 8

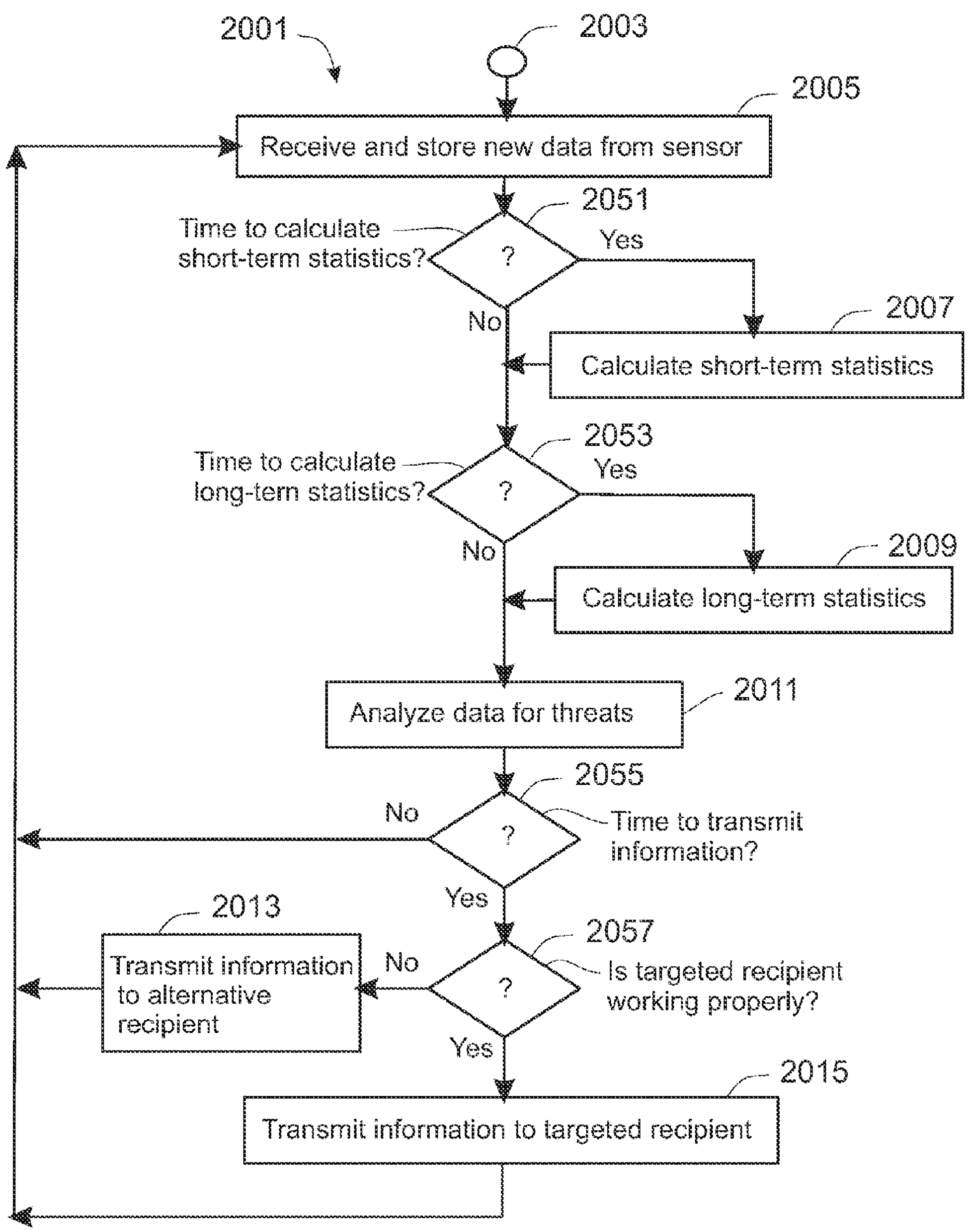

2001
2003
2005
Receive and store new data from sensor
2051
Time to calculate short-term statistics?
?
Yes
No
2007
Calculate short-term statistics
2053
Time to calculate long-term statistics?
?
Yes
No
2009
Calculate long-term statistics
Analyze data for threats
2011
2055
No
?
Time to transmit information?
Yes
2013
2057
Transmit information to alternative recipient
No
?
Is targeted recipient working properly?
Yes
2015
Transmit information to targeted recipient

FIG. 9

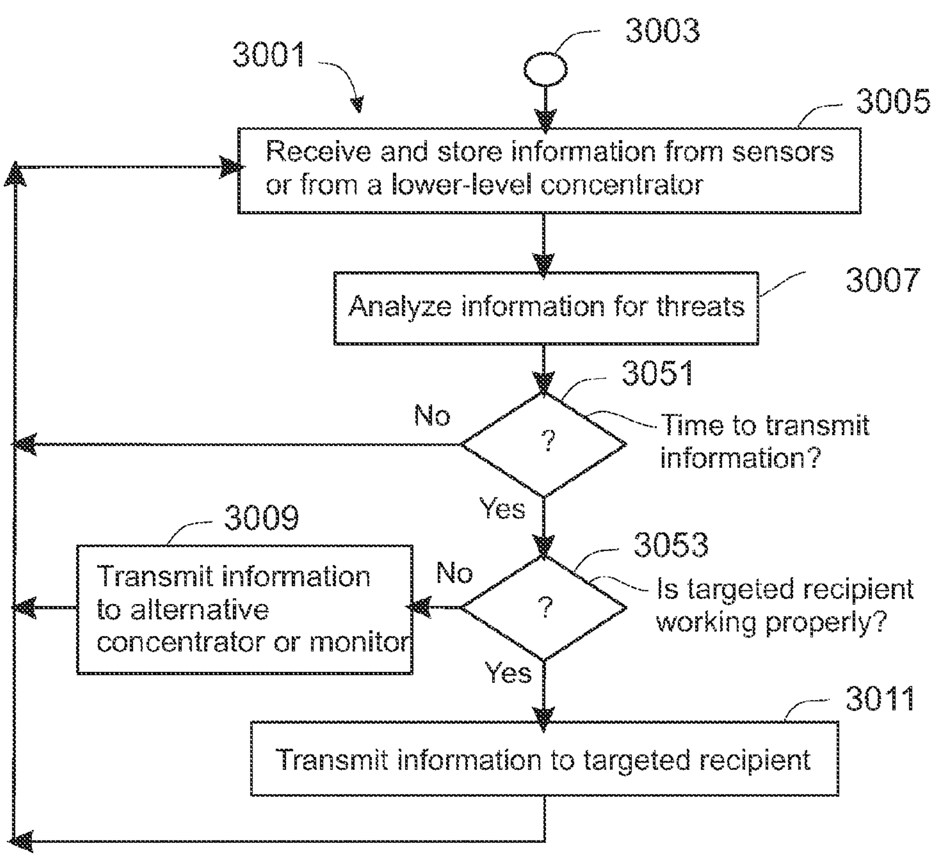

3003
3001
3005
Receive and store information from sensors or from a lower-level concentrator
Analyze information for threats
3007
3051
No
?
Time to transmit information?
Yes
3009
3053
Transmit information to alternative concentrator or monitor
No
?
Is targeted recipient working properly?
Yes
3011
Transmit information to targeted recipient

FIG. 10

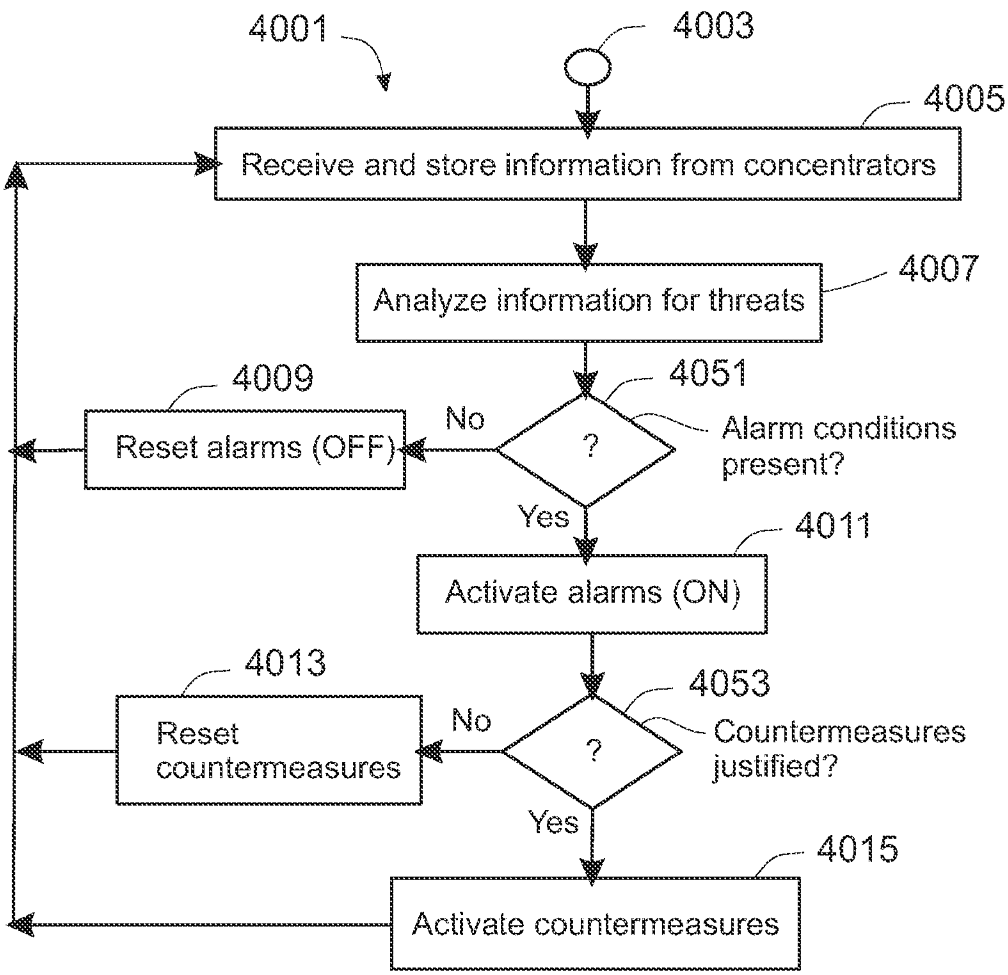

4001
4003
4005
Receive and store information from concentrators
4007
Analyze information for threats
4009
4051
No
Reset alarms (OFF)
?
Alarm conditions present?
Yes
4011
Activate alarms (ON)
4013
4053
No
Reset countermeasures
?
Countermeasures justified?
Yes
4015
Activate countermeasures

FIG. 11

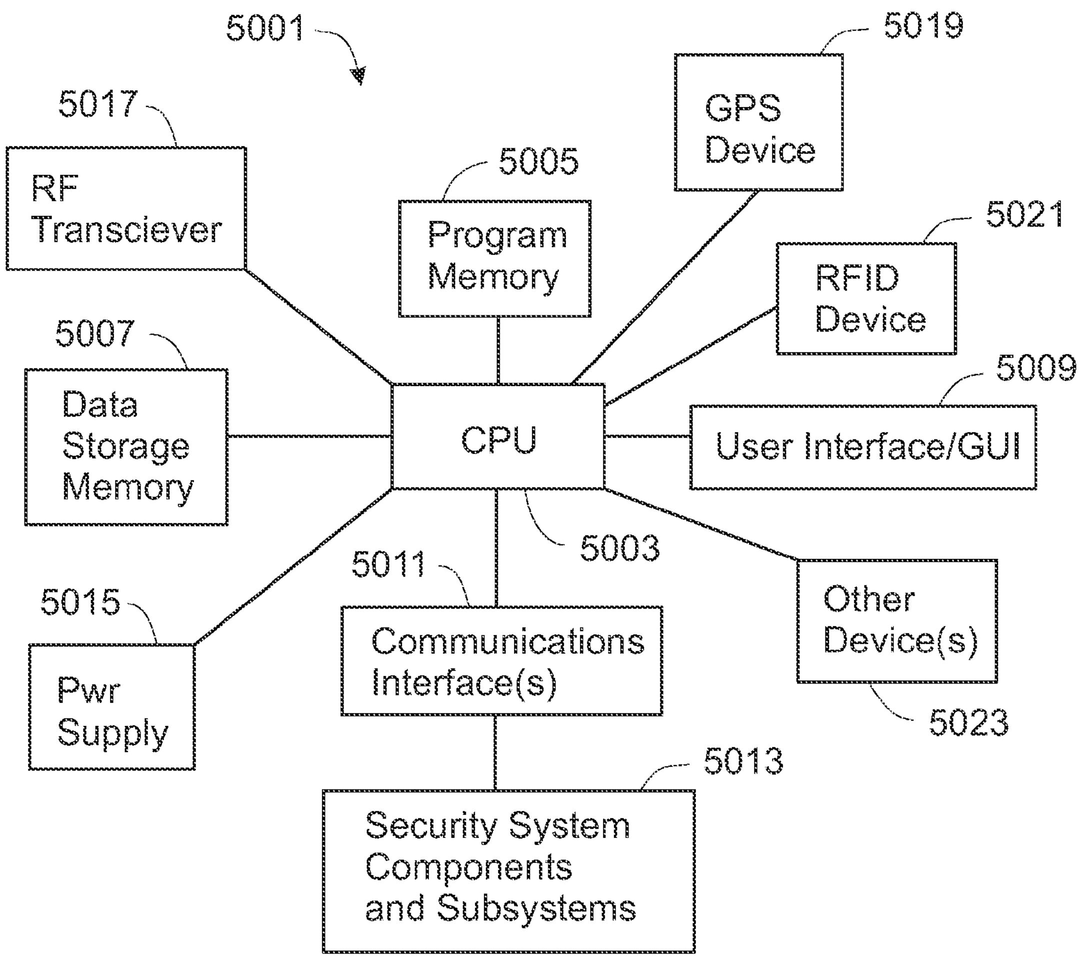

5001
5017
RF Transciever
5005
Program Memory
5019
GPS Device
5021
RFID Device
5007
Data Storage Memory
CPU
5009
User Interface/GUI
5003
5011
5015
Pwr Supply
Communications Interface(s)
Other Device(s)
5023
5013
Security System Components and Subsystems

FIG. 12

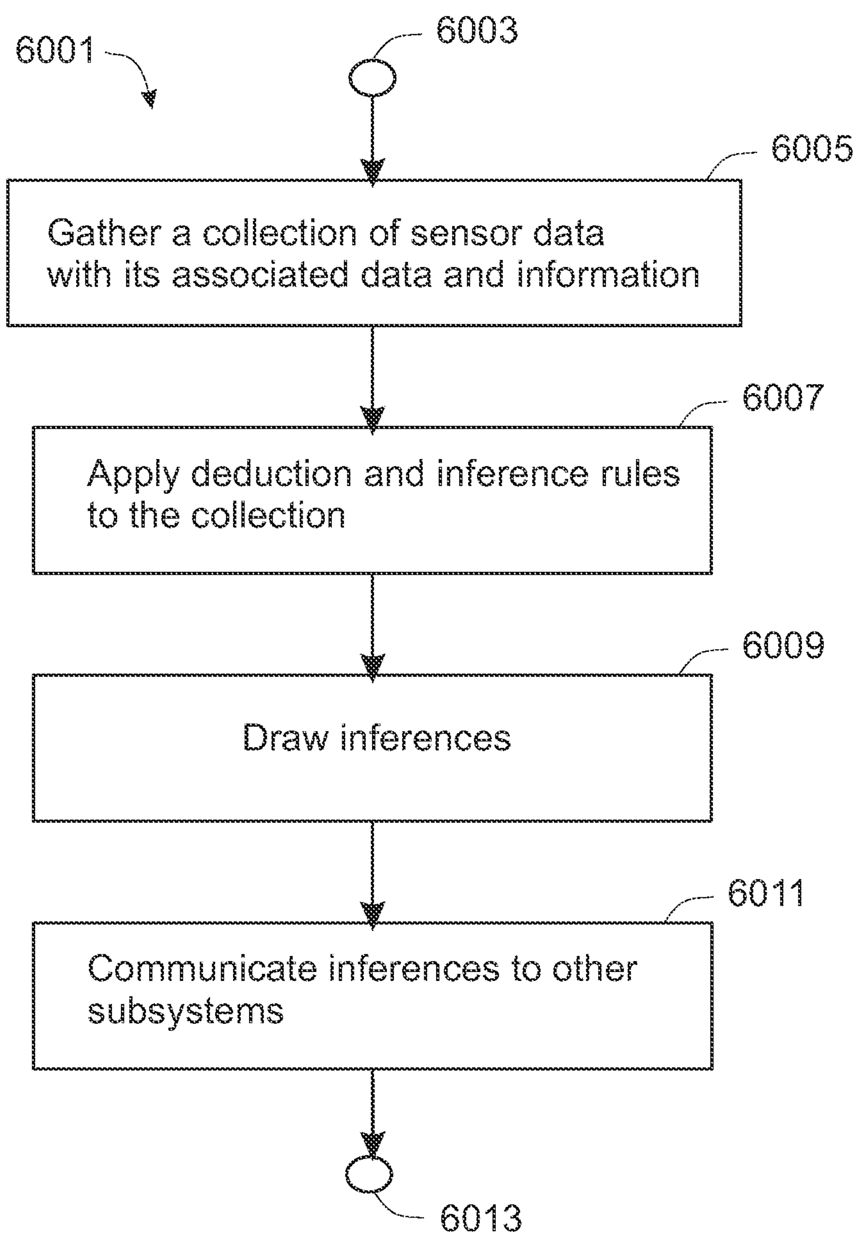

6001
6003
6005
Gather a collection of sensor data with its associated data and information
6007
Apply deduction and inference rules to the collection
6009
Draw inferences
6011
Communicate inferences to other subsystems
6013

FIG. 13

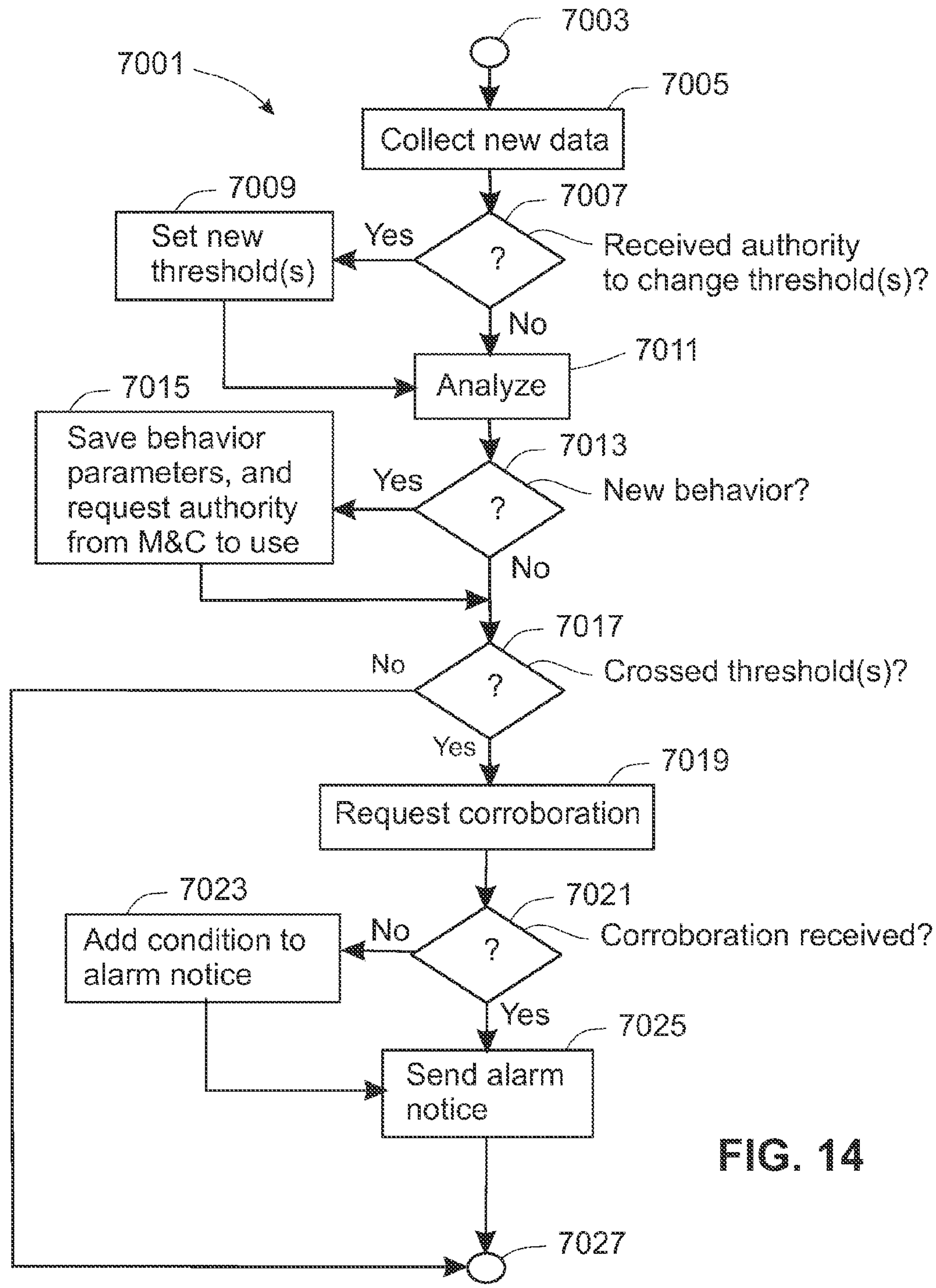
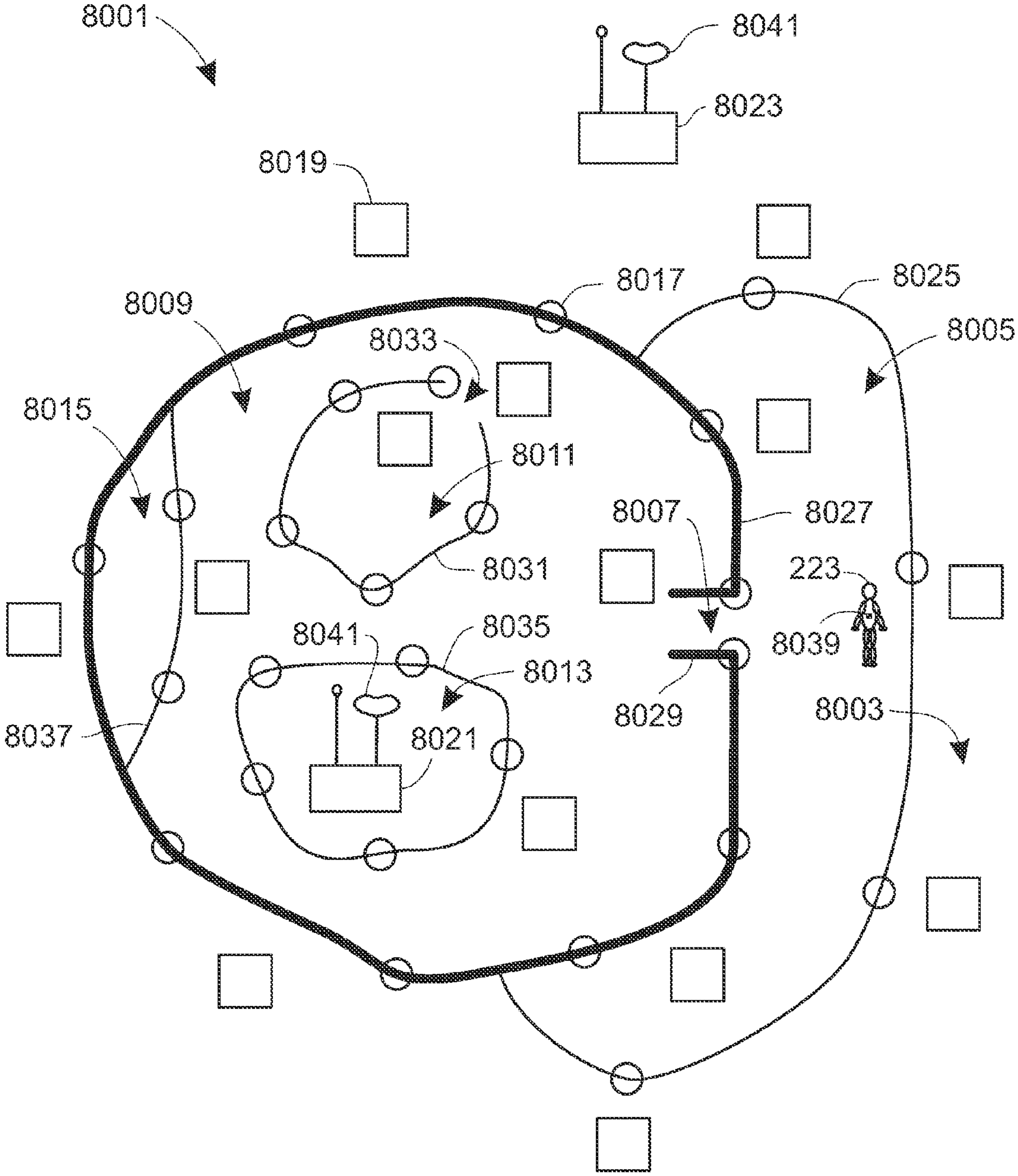

7001
7003
7005
Collect new data
7007
Received authority to change threshold(s)?
?
Yes
7009
Set new threshold(s)
No
7011
Analyze
7013
New behavior?
?
Yes
7015
Save behavior parameters, and request authority from M&C to use
No
7017
Crossed threshold(s)?
?
No
Yes
7019
Request corroboration
7021
Corroboration received?
?
No
7023
Add condition to alarm notice
Yes
7025
Send alarm notice
7027

FIG. 14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8005
8033
8015
8011
8007
8027
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223
8041
8035
8039
8013
8029
8003
8021
8037

FIG. 15

DIVERSITY NETWORKS AND METHODS FOR SECURE COMMUNICATIONS

CROSS-REFERENCE TO RELATED APPLICATIONS

This Non-provisional patent application claims the benefit of U.S. Provisional application No. 61/325,157, filed Apr. 16, 2010, hereby incorporated by reference. This application also relates to co-owned Non-provisional patent applications simultaneously-filed on Sep. 8, 2010 along with the present application and titled "Security Systems Having Communication Paths in Tunnels of Barrier Modules and Armored Building Modules", and application Ser. No. 12/877,670; "Security Systems with Adaptive Subsystems Networked through Barrier Modules and Armored Building Modules", and application Ser. No. 12/877,728, now U.S. Pat. No. 8,674,831; "Autonomous and Federated Sensory Subsystems and Networks for Security Systems", and application Ser. No. 12/877,794, now U.S. Pat. No. 8,384,542; and "Global Positioning Systems and Methods for Asset and Infrastructure Protection", and application Ser. No. 12/877,816, now U.S. Pat. No. 8,471,700; the disclosures of which are hereby incorporated by reference in their entireties.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not Applicable

THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT

Not Applicable

INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC

Not Applicable

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to security systems for protecting facilities, personnel, and communications in a defined area from military or terrorist threats such as hostile forces, fire arms, mortars, explosives, and/or attack vehicles.

2. Description of the Related Art

Security zones for protecting groups of people and facilities be they private, public, diplomatic, military, or other, can be dangerous environments for people and property if threatened by military acts or acts of terrorism. The prior arts in security systems and armored protection provide some solutions but fall far short of being synergistically integrated.

In the prior art, automated security systems sense disturbances to an ambient condition and cause alarms to be activated, but these systems fall short of being able to identify many cause(s) of a disturbance. U.S. Patent Application Publication No. 2006/0031934 by Kevin Kriegel titled "Monitoring System", incorporated herein by reference in its entirety, discloses a system that monitors and controls devices that may sense and report a location's physical characteristics through a distributed network. Based on sensed characteristics, the system may determine and/or change a security level at a location. The system may include a sensor, an access device, and a data center. The sensor detects or measures a condition at a location. The access device communicates with the sensor and the data center. The data center communicates with devices in the system, manages data received from the access device, and may transmit data to the access device.

Rows of concrete barrier blocks (i.e. rows of concrete barrier modules) that can slide across the ground can stop and destroy terrorist vehicles that collide with them, and can protect against blast waves and blast debris, but they offer no earlier warning signals of threats. U.S. Pat. No. 7,144,186 to Roger Allen Nolte titled "Massive Security Barrier", U.S. Pat. No. 7,144,187 to Roger Allen Nolte and Barclay J. Tullis titled "Cabled Massive Security Barrier", and U.S. Pat. No. 7,654,768 to Barclay J. Tullis, Roger Allen Nolte, and Charles Merrill titled "Massive Security Barriers Having Tie-Bars in Tunnels", all incorporated herein by reference in their entireties, disclose barrier modules and barriers constructed of barrier modules. U.S. Pat. No. 7,144,186 discloses barrier modules, each with at least one rectangular tie-bar of steel cast permanently within concrete or other solid material and extending longitudinally between opposite sides of the barrier module, wherein adjacent barrier modules are coupled side-against-side by means of strong coupling devices between adjacent tie-bars, and wherein no ground penetrating anchoring means is involved. But since the tie-bars are cast within the barrier modules, they cannot be changed out or upgraded without removing and replacing the solid material as well. However, U.S. Pat. No. 7,144,187 discloses barrier modules of solid material with tunnels extending between opposite sides, wherein adjacent barrier modules are coupled side-against-side with cables passing through the tunnels and anchored to sides of at least some of the barrier modules by anchoring devices. And U.S. Pat. No. 7,654,768 discloses barrier modules that have tie-bars in tunnels that extend longitudinally between opposite sides of a barrier module.

Armored steel guard houses and other armored structures for buildings provide some protections to their occupants, but also do not integrate conveniently with communication infrastructure needed to support an electronic security system. However, U.S. Pat. No. 7,661,228 to Roger Allen Nolte and Donald L. Selke titled "Armored building modules and panels", incorporated herein by reference in its entirety, discloses armored building elements that not only have open channels running throughout their length, but also create an open channel between any two that are abutted side-by-side to one-another, and it is these channels that afford much of the structures resistance to mortar and ballistic weaponry.

BRIEF SUMMARY OF THE INVENTION

The present invention exploits properties of the inventions disclosed in the above-mentioned four patents and one patent application publication in ways not previously discovered to advance convergence of physical and cyber security. Given the present disclosure, it can be realized that what was needed and what is provided by the inventions disclosed by the present disclosure are security systems that synergistically integrate and exploit these prior arts to realize the following:

a) use of tunnels to protect communications and power lines within security barriers that comprise strongly interconnected barrier modules that don't penetrate the ground and that will slide over the ground rather than break loose and become disconnected from one-another when challenged by a terrorist vehicle or explosive blast,

b) use of these same barriers modules to house sensors and equipment,

c) use of channels within armored steel building modules to protect communications lines and to house sensors and equipment,

d) use of meaningful information derived from combinations of these and other sensors,
e) use of redundant and dynamically alterable communications networks of various forms and types,
f) use of countermeasures,
g) use of power and bandwidth conservation techniques,
h) use of electronic subsystems capable of autonomous operation,
i) use of stealth, and
j) use of system-level management including tie-ins to Tactical Operations Centers and Network Operations Centers.

The inventions are pointed out with particularity in the appended claims. However, some aspects of the invention are summarized herein.

The inventions include security systems that can include sensing, networked communications, alarms, countermeasures, and stealth, any or all of which may adapt to threats. These systems may also include and be physically and synergistically integrated with barrier modules, with armored building modules, and with other security structures of concrete, steel, or more exotic materials. They can adapt to severity of threats, weather, and/or other situational aspects. They can anticipate at least some threats in order to obtain early warning and react more quickly to those threats. They can adapt by altering their configurations, including alterations in communication networking structures and methods, and changes in data-storage and processing duties within subsystems and processing nodes. Defensive and/or offensive countermeasures can be part of such security systems and be employed to deter, confuse, trap, and/or disable terrorists. Countermeasures may include defensive or offensive weapons as well as emitters of other disturbances (i.e. disturbance emitters) such as loud noises or bright flashes of light. Examples of non-lethal weapons include water canons, emitters of loud sounds or shock waves, microwave emitters that inflict discomfort, automated guns that shoot stunning pellets, emitters of noxious gases, emitters of bright light, and more. Examples of lethal weapons include automatic guns with real ammunition, canons, blinding laser emitters, destructive shock-wave emitters, high-voltage surfaces, high-voltage projected barbs, missiles, deployable tanks, vehicle rams, and more. The systems and/or their subsystems can be capable of self-maintenance, self-healing, and self-restoration as threats subside. The systems can include subsystems that are capable of autonomous operation and/or capable of operating as cooperating members in a federation of subsystems that are in communication with one-another. Such autonomous and/or federated subsystems are able to operate without communication with a main monitor and control subsystem when desirable for reason of stealth or in response to being cut-off from the main monitor and control center (at least until reconnected to a monitor and control subsystem). At least some of the systems and/or their subsystems are capable of allocating and/or conserving power among subsystems, and of regulating and/or reducing bandwidth utilizations, both particularly in response to a terrorist threat or other constraint placed on the system.

Other aspects of the invention as demonstrated in the disclosed example embodiments include the following. Security barriers with tunnels and cavities can be used to a) protect and route communication and power cables, b) house and protect sensors and other equipment including power sources and transceivers, and c) enhance an electronic security system by extending coverage to the security barrier and its surrounding environment. Armored building modules can be used to provide these same advantages, but in addition can be used to a) protect cables along the outside surfaces of security barriers and/or barrier modules and b) hide and protect cables beneath the ground. Security sensors can be used that a) adjust their own detection thresholds after requesting authority to do so, b) seek corroboration of threshold-crossing events by analyzing data and/or information from other sensors for correlations, c) purposefully induce changes to a sensor's environment by controlling use of countermeasures or other disturbance emitters, d) use one or more deduction and inference engines, e) work in groups to derive additional sensory information, and f) derive information from combinations of sensor signals. Secure sensors can use a) sensor ID's, b) encryption of data, c) scheduled or un-scheduled times for communication, and d) diversity communications. Security systems can a) use and exploit communication diversities, b) use overlapping networks, c) transform themselves in defense and offense, and d) exploit barrier modules and armored building modules (and security barriers and paneling modules in general) and even use them as continuity sensors. Security systems can include a) autonomous subsystems, b) autonomous subsystems that can federate into a mutually supporting and synergistic group, and c) federated methods of deception, stealth, robustness, and power and bandwidth conservation. Security Systems can take countermeasures (lethal and/or non-lethal). Security systems can use conservation means to conserve power and/or bandwidth. Security systems can geo-track sensors and other assets (other personnel or equipment).

OBJECTS AND ADVANTAGES OF THE INVENTION

Objects and advantages of the present invention include security systems that significantly out-perform those of the prior art by synergistically integrating electronic security systems with physical security systems, and/or by synergistically adding: collective analyses of signals from multiple and/or dissimilar sensors; dynamic adaptations in sensor utilizations; and dynamic adaptations in communication structures and methods, countermeasures, and stealth. The objects and advantages are also to achieve security systems that are armored and pro-active in the use of response tactics and in the use of sensors and artificial intelligence to improve responses to conditions indicative of potential threats.

Further advantages of the present invention will become apparent to ones skilled in the art upon examination of the accompanying drawings and the following detailed description. It is intended that any additional advantages be incorporated herein.

The various features of the present invention and its preferred embodiments and implementations may also be better understood by referring to the accompanying drawings and the following detailed description. The contents of the following description and of the drawings are set forth as examples only and should not be understood to represent limitations upon the scope of the present invention.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

The foregoing objects and advantages of the present invention for armored and pro-active security systems may be more readily understood by one skilled in the art with reference being had to the following detailed description of several embodiments thereof, taken in conjunction with the accompanying drawings. Within these drawings, callouts using like reference numerals refer to like elements in the several figures (also called views) where doing so won't add confusion, and alphabetic-letter-suffixes where used help to identify copies of a part or feature related to a particular usage and/or relative location. The use of primes on the callouts are used mostly for distinguishing, in the views, a right-hand side or end of an element from the left-hand side or end of that element. Within these drawings:

FIG. **1** shows a perspective view of a security site, from near an entrance gate with a guard house, protected by an armored security system.

FIG. **2** shows a cross-section of a barrier module having a tunnel being used to house and protect communications and power cables as well as sensors and other equipment.

FIG. **2**A shows a perspective view of a security wall in one embodiment that comprises a pair of security barrier modules.

FIG. **2**B shows a cross-sectional view of one embodiment of coupling devices used to secure the pair of security barrier modules, shown in FIG. **2**, side-against-side to one-another.

FIG. **3** shows three side-against-side armored building modules having side-lap overhangs and being used to route communications and/or power cables.

FIG. **4** shows one possible embodiment of a sensor subsystem such as could be housed within a security barrier.

FIG. **5** shows multiple subsystems interconnected by a network.

FIG. **6** shows a hierarchical network of interconnected sensors, signal concentrators, a security monitor and control subsystem, and alarms.

FIG. **7** shows a high-level view of security components networked by a private intranet connected to the Internet via a firewall.

FIG. **8** shows an example of multiply diverse communication connections between a small set of subsystems.

FIG. **9** shows a method of collecting sensor data, analyzing the data for information, and communicating information to a working concentrator subsystem.

FIG. **10** shows a method used by a concentrator to receive information and data from sensors, analyzing the information and data collectively for threat information, and communicating that threat information to another working concentrator or to a monitoring and control subsystem.

FIG. **11** shows a method used by a monitoring and control subsystem to receive information from concentrators, to analyze that information for threats, to control alarms, and to take countermeasures.

FIG. **12** shows a computer subsystem in block diagram form representing a computing engine and associated components.

FIG. **13** shows a flow chart of process steps within a method used by some embodiments of the invention to make inferences.

FIG. **14** shows a flow chart of a method used by a sensor subsystem to actively participate in learning improved analysis and decision rules.

FIG. **15** shows a diagrammatic plan-view representation of a security site.

DETAILED DESCRIPTION OF THE INVENTION

The following is a detailed description of the invention and its preferred embodiments as illustrated in the drawings. While the invention will be described in connection with these drawings, there is no intent to limit it to the embodiment or embodiments disclosed. On the contrary, the intent is to cover all alternatives, modifications and equivalents included within the spirit and scope of the invention as defined by the appended claims.

FIG. **1** shows a perspective view of a security site **101** protected by an armored security system **11**. The location of a centralized monitoring and control subsystem **103** is in a secure region **105** separated physically from an unsecure region **107** by a security barrier **109** (which may or may not be at least partly camouflaged or decorated with images to fool a viewer) shown here as a row or series of barrier modules. Within this disclosure and claims, the terms "barrier module" and "barrier block" are defined to mean one of those patented by the following patents: a) U.S. Pat. No. 7,144,186 to Roger Allen Nolte titled "Massive Security Barrier", b) U.S. Pat. No. 7,144,187 to Roger Allen Nolte and Barclay J. Tullis titled "Cabled Massive Security Barrier", and c) U.S. Pat. No. 7,654,768 to Barclay J. Tullis, Roger Allen Nolte, and Charles Merrill titled "Massive Security Barriers Having Tie-Bars in Tunnels", all incorporated herein by reference in their entireties. Also within this disclosure and claims, the terms "security barrier" and "blocks" (i.e. without the modifier "barrier" immediately preceding them) are used more generally to mean a barrier that provides security, however when a security barrier comprises barrier modules (also called barrier blocks), then at least some of the adjacent barrier modules within such a security barrier will be defined to be coupled together (i.e. interconnected) according to at least one of the aforementioned three patented inventions. An access roadway **111** runs through an access gateway **113** providing access between the two areas **105**,**107**. A guard house **115** stands porter at the access gateway **113**. A first gateway extension barrier module **117** and a second gateway extension barrier module **119** together provide additional length to the access gateway **113** along the access roadway **111**. A first gateway-opening barrier module **121** and a second gateway-opening barrier module **123** border the opening in the security barrier **109**. One or more additional parts of the current invention can be hidden beneath the roadway **111** at a location illustrated as a rectangle just outside the access gateway **113**.

FIG. **1** also shows a barrier module **125** with camera **153**. On the side of this barrier module **125** that faces the unsecure region **107** are shown a first access hole **131** and a second access hole **133** in the barrier module **125**. These access holes **131**, **133** (which may be of any shape and not just circular as shown) run into the barrier module **125** to at least one cavity within the barrier module **125** and can be used as an airway to that cavity as well as a path along which to extend a sensor probe, such as a small camera, outside the barrier module **125**. Such a camera can hide within the barrier module **125** and be automatically extended and manipulated to look outward from the barrier module **125** or back and forth along the length of the security barrier **109**, as when searching for a person attempting to hide along the security barrier **109**. Another camera is shown as pop-out camera **135**, shown sticking out of a camera portal **137** on the non-secure side of the barrier modules **125**. Such access holes **131**, **133** (and camera portals **137** with pop-out cameras **135**) may also be located on the secure side and/or the top of the barrier module **125** to achieve other views outside the barrier module **125**. In some embodiments of the invention, image sensors such as the pop-out camera **135** can be controlled from a sensor subsystem within the barrier to pop out and capture still images and/or video of environment surrounding the security barrier **109**. If such cameras are made to briefly pop out and back into the barrier again at unpredictable times, it would be difficult for a terrorist to anticipate their presence and defeat them. Furthermore given the significant quantity of barrier modules used in a security barrier **109**, it would be difficult to defeat all of them at once. On a side of the barrier module **119** that faces the secure region **105** are shown at least a cavity **149** within the barrier module **119** and a door **151** to a sensor or device within the barrier module **119**. A surveillance camera **153** is shown supported by an extendable arm **155**. On top of the camera **153** is shown a door panel **157** that covers a camera cavity **159** within the barrier module **125** when the camera **153** is retracted into the barrier module **125**. It should be observed in this illustration and embodiment that the security barrier **109** includes a row of barrier modules set on the ground **215** (e.g. barrier modules **117**, **119**, **121**, **123**, **125**, **161**) and not stacked vertically with other blocks.

FIG. **1** also shows a barrier module with a gun **161**, where the gun **163** is mounted on an extendable gun mount **165** that is normally housed within a gun cavity **167** in the barrier module **161**. A door **169** to the gun cavity **167** is also shown.

FIG. **1** also shows a door **171** on top of barrier module **123**, where the door **171** can be to a sensor or device housed within the barrier module **123**. Alongside the door **171** is shown a solar panel **173** that can collect power that can be used in charging batteries within the barrier modules for powering communications subsystems, sensors, cameras, guns, and other barrier accessories normally housed within one or more barrier modules.

FIG. **1** also shows a securing cable **183** across the access gateway **113**. The securing cable **183** is anchored at both the first and second gateway-opening barrier modules **121**,**123**, and it is show hidden within a slot **181** within the access roadway **111**. By way of a take-up mechanism within at least one of the gateway-opening barrier modules **121**,**123**, this securing cable **183** can be lifted out of the slot **181** and pulled tightly across the access gateway **113** as a countermeasure for physically blocking the access gateway **113** when needed to deter or stop entry of a threatening vehicle.

FIG. **1** also shows underground sensor devices **201** placed outside the security barrier **109** in numerous locations within the unsecure region **107**. These sensor devices **201** may be ground vibration sensors or weight sensors such as to sense a person walking or a vehicle traveling nearby, gas sensors, proximity sensors, or any other type of sensor that could give early warning to a monitoring and control subsystem of the presence or activity of a potential terrorist or of other threatening disturbances in the environment outside the secure region **105**.

FIG. **1** also shows a first sensor **211** hidden in a plant or disguised as a plant. In the foreground of the view, and in the unsecure region **107**, is shown a sensing device **213** or subsystem that may be real, a decoy, a device that provides misinformation, or a countermeasure device. An RFID (radio-frequency identification device) **219** is shown on the sensing system **213**. Such RFID devices can be attached to any or all of the objects comprised by the security system **11**. And a person **223** is shown wearing a GPS (global positioning device) **221**. Such GPS devices could also be made part of any or all of the objects and/or subsystems comprised by the security system **11**, and alarms conditions could be set by movement of any of them outside their respective predefined boundaries. Also shown is the surface of the ground **215**. A friendly person known not to be a terrorist can be given a GPS by which he/she could be tracked, and by which the sensor and higher-level subsystems of the security system **11** could be made to assure that person's presence and activities don't set off any alarms. In the distance, and in the secure region **105**, is shown another sensor **217** hidden in a tree (or disguised as a tree).

FIG. **1** also shows an antenna **301** at the location of a centralized monitoring and control subsystem **103**. The centralized monitoring and control subsystem **103** is shown here as located within a building. Not shown, and maybe located at

the same location as the centralized monitoring and control subsystem **103**, would be a Tactical Operations Center (TOC) and perhaps also a Network Operations Center (NOC) both of which would be in communication with the armored security system **11**. Another antenna **303** is shown on the guard house **115**. Another antenna **305** is shown on a barrier module. Another antenna **307** is shown on the real or decoy sensing (or other) device **213**. Signals **309** via a wireless medium are depicted being transmitted or received from the antenna **301** at the centralized monitoring and control subsystem **103**.

FIG. **1** also shows the roof **401** of the guard house where the antenna **303** is mounted. The walls **403** and the roof **401** of the guard house may be constructed of armored steel building modules having side-lap overhangs. Within this disclosure and claims, the terms "armored building module" and "building module" are defined to mean one of those patented by U.S. Pat. No. 7,661,228 to Roger Allen Nolte and Donald L. Selke titled "Armored building modules and panels", incorporated herein by reference in its entirety. A first window **405** is shown on the guard house along with a second window **407**. Within the second window **407** is shown an opaque armor filling the window but having a peep hole **409**. This window armor with the peep hole **409** can be taken away or replaced automatically in response to perceived threats.

FIG. **1** also shows an airplane **501** in flight which may provide additional sensory and observational inputs along with the other sensors mentioned above, as well as countermeasure options, to the armored security system **11**. A horizon **503** is also shown.

All of the objects shown in FIG. **1**, with the possible exception of perhaps the horizon **503** and the ground **215**, are comprised by at least some of the embodiments of the invention.

FIG. **2** shows a longitudinal cross-section of the barrier module **125** (also called a barrier block) having a barrier tunnel **603** through the barrier module **125**, wherein the barrier tunnel **603** is used to house and protect a communication medium **601** (e.g. a communications cable). The tunnel **603** can also be called a hole through the barrier module **125**. The barrier module **125** can be made substantially of concrete. The cross-section taken is that indicated by the arrows numbered **2** in FIG. **1** on the barrier module **125** with the camera **125**. The communications medium **601** is shown here as a cable which may or may not have an armored outer jacket such as made of braided metal or ceramic fibers perhaps bound with a non-metallic resin, epoxy, or other glue. This communications cable **601** continues beyond this barrier module **125** in both directions as, for example, into and perhaps through similar tunnels in adjacent barrier modules forming the security barrier **109** (shown in FIG. **1** as a row of barrier modules). Two such barrier modules **127**,**129** are shown respectively adjacent each end of the barrier module **125**. This barrier tunnel **603** can be one of the same one or more tunnels used to contain an element **602** that can be chain, steel cable, and/or one or more tie-bar(s) used to rotatably couple adjacent barrier modules to one another securely, or it can be another barrier tunnel **604** made in the barrier module **125** and similarly in adjacent barrier modules such as barrier modules **127** and **129**. The tie-bars are preferably made of high-strength steel, are also called "beam(s)", and are movable within the tunnels thus leaving room for others items to fit within the tunnels. In the illustration of FIG. **2**, the element **602** is shown as a tie-bar with its ends each connected by way of a respective pin **613** to similar ends in similar tie-bars **617** and **619** within the adjacent barrier modules **127**,**129**. The elements **609**,**611** to either side of a pin **613** are retainer plates used to keep that pin **613** from entering tunnels of the barrier modules. The ground **215** that supports the barrier module **125** is shown, as are the previously described extendable arm **155** (that holds a camera that is retractable within a cavity inside the barrier module **125**) and the antenna **305** on the barrier module **125**. First and second connection tunnels **605**,**607** are also shown, whereas these provide access paths between the barrier tunnel **603** and cavities within the barrier module **125**. The cavities house, hide, and protect equipment **179** such as sensor units, power supplies, countermeasure systems, sensor data concentrators, and communications equipment within the barrier module **125**. It should be noted that the communication medium **601** routed through the barrier module **125** can serve as both an event sensor and as a location sensor should it become damaged or severed when the barrier module **125** is damaged or destroyed by a terrorist. When a barrier module is damaged or destroyed, it is also possible for the security system **11** to determine where along the security barrier **109** such an event has taken place. This is because subsystems within a barrier module that becomes damaged or destroyed may become inoperative or operate improperly and will thus be indicators to the security system **11** that those subsystems are located near a region of significant disturbance and are likely the result of a security threat. Power cables, if they are routed through and between tunnels of barrier modules, also serve as continuity sensors and therefore event-location sensors in the same manner as communication media and cables do.

FIG. **2**A shows a perspective view of two massive security barriers **513**A and **513**B adjacent to one another, the massive security barrier **513**A on the left and the massive security barrier **513**B on the right in the view, coupled together side-against-side into a coupled pair of massive security barriers **505** to form a short security wall **507** which might stand alone or be two of many such barrier elements with a longer row or chain of similar barrier elements as modules, such as in security barrier **509** shown in FIG. **1**. The barriers **513**A and **513**B are sitting on top of a supporting surface such as a ground surface **215**. One skilled in the art should appreciate that such a supporting surface could be, for example, the ground surface of a lawn, the surface of an open field, the surface of a parking lot, the surface of a roadway, the surface of a shoulder of a roadway, the surface of a plaza, etc. In this embodiment, the massive security barrier **513**A is comprised of a mass of solid material **511**A and two tie-bars (**561**A and **563**A called out in the cross-sectional view of FIG. **2**B) whose left-hand ends **521**A and **523**A are visible in this view. Also, the massive security barrier **513**B is comprised of a mass of solid material **511**B and two tie-bars (**561**B and **563**B called out in the cross-sectional view of FIG. **2**B). It should be appreciated by one skilled in the art that other embodiments of the invention could be comprised of only one tie-bar per barrier, or more than two tie-bars per barrier. It should also be appreciated by one skilled in the art that other embodiments of a security wall by the invention can be comprised of a row of multiple barriers preferably numbering greater than merely the two illustrated. Note that front vertical edges are also shown as edge **551**A on barrier **513**A, and edge **551**B' on barrier **513**B. A rear vertical edge **553**A on barrier **513**A is also shown.

In regard to FIG. **2**A, the mass of solid material **511**A has two opposite sides **529**A and **529**A', and the mass of solid material **511**B has two opposite sides **529**B and **529**B'. The two masses of solid material **511**A and **511**B are shown adjacent to one another with sides **529**A' and **529**B against one another (i.e. at least nearly touching one another) thereby defining an interface region **515**. Within each side of each barrier is a cavity into which the one or more tie-bars associated with that barrier penetrate. The mass of solid material **511**A of barrier **513**A has cavities **517**A and **517**A'. The mass of solid material **511**B of barrier **513**B has cavities **517**B and **517**B'. Tie-bar ends **521**A and **523**A are visible in this view extending into cavity **517**A at the far left of the view. In cavity **517**A at the left end of the security wall **507**, a coupling pin **571**A is visible along with its head **573**A. The coupling pin **571**A extends through both tie-bar ends **521**A and **523**A, through hole **533**A in the lower tie-bar **523**A and hole **531**A (not visible in this view, but similar to hole **533**A) in the upper tie-bar **521**A.

In regard to FIG. **2**A, holes such as hole **533**A are in both ends of each tie-bar and are oval shaped with extension parallel to the length-wise dimension of its corresponding tie-bar. Such extensions can accommodate deviations in the accuracy of the placement of the holes when inserting a coupling pin (such as coupling pin shown with head **573** in this view between the two barriers **513**A and **513**B) during installation of a security wall (such as **507**). These oval shaped holes are also used to alleviate tension between coupled tie-bars during the very initial interaction between coupled barriers when a security wall of which the barriers are apart is first struck by a moving vehicle, a period in time during which the security wall begins to change shape as barriers begin to slide across the supporting surface **535** and as some of the masses of solid material that interfere with mutual rotation of adjacent barriers begins to break away.

In regard to FIG. **2**A, also visible is a retainer **549**A that both tie-bars with ends **521**A and **523**A extend through. In cavity **517**B' at the right end of the security wall **507**, the head **573**B' is visible of coupling pin **571**B' (the body of pin **571**B' is not visible in this view) along with a retainer **549**B', both in a similar arrangement as the coupling pin **571**A and retainer **549**A shown at the left end of the security wall **507**, only attached to the tie-bars of barrier **513**B instead. Within the interface region **515**, the cavity **517**A' of barrier **513**A and the cavity **517**B of barrier **513**B together form a combined cavity **519** between these adjacent barriers **513**A and **513**B. Within this combined cavity **519**, the head **573** of a coupling pin **571** (pin **573** is not visible or labeled in this view but is visible and labeled in the sectional view of FIG. **2**B) and two retainers (not labeled in this view but labeled in the sectional view of FIG. **2**B as **549**A' and **549**B) are visible. Note that the head **573** of coupling pin **571**, and the coupling pin **571** itself (the pin coupling the two barriers **513**A and **513**B together in the interface region **515** and visible in FIG. **2**B), could each alternatively be labeled with a suffix of A' or B because they can be considered as either the coupling pin at the right-hand side of the left barrier or the coupling pin at the left-hand side of the right barrier. It will be readily appreciated by one skilled in the art that after completion of installation of a security wall such as **507**, it is advisable to protect the otherwise exposed tie-bar ends and means for coupling (and means for retaining if used) with protective covers and/or sealing means to conceal the presence of the cavities, discourage tampering, and keep out rain and snow.

FIG. **2**B is a sectional view from FIG. **2**A showing the coupling pin **571** (means for coupling) with its head **573** used to couple the two barriers **513**A and **513**B together sides-against-side with the tie-bars **561**A and **563**A of one barrier positioned end-to-end respectively with the tie-bars **561**B and **563**B of the other barrier. Also shown are the two retainers **549**A' and **549**B (both are means for retaining) located to either side of the coupling pin **571**. The position of the cross-section is such as not to cut into the coupling pin **571** or head **573** or either tie-bar **561**A or **563**A, but does cut into the retainers **549**A' and **549**B and the masses of solid material

511A and 511B and their tunnels 525A, 527A, 525B and 527B. In this embodiment, the coupling pin 571 is shown with a threaded end 575 and fastened into place with washers 579 and a nut 577. One skilled in the art will readily appreciate that the relative vertical positioning of the upper tie-bars 561A and 561B relative to one another, and the relative vertical positioning of the lower tie-bars 563A and 563B relative to one another, can be in any of a variety of arrangements and not just that shown with the tie-bars 561B and 563B positioned above the tie-bars 561A and 563A. For example, two tie-bars of one barrier can be located between two tie-bars of an adjacent barrier.

In regard to FIG. 2B, for illustrative purposes only, a small gap is shown between a side of the barrier 513A and a mutually facing side of barrier 513B, in the interface region 515; but this gap in practice should be kept as small as is practical and smaller than approximately the diameter of the illustrated coupling pin 571. Preferably the two barriers 513A and 513B would be touching one another at their mutually facing sides. The purpose of keeping the gap at the interface region 515 as small as practical is to force portions of the solid material to have to be broken away from front and/or rear surfaces (surfaces such as front surface 545A of barrier 513A, and front surface 545B of barrier 513B) that include at least a portion of one of the vertical edges of one of the barriers (edges such as the vertical edge 551A' on barrier 513A, and vertical edge 551B on barrier 513B) before significant mutual rotation can occur between adjacent barriers (such as between barriers 513A and 513B).

In regard to FIG. 2B, one skilled in the art will readily recognize that the coupling pin 571 that is shown coupling both upper tie-bars 561A and 561B together, as well as coupling both lower tie-bars 563A and 563*b* together, could be replaced with a coupling arrangement involving a pin (or one or more bolts) coupling the upper tie-bars that are separate from a pin (or one or more bolts) coupling the lower tie-bars. Another embodiment could use one coupling pin to both couple the upper tie-bars and to couple the lower tie-bars, but wherein no threads or nut are used at the lower end of the coupling pin.

FIG. 3 shows an adjacent triplet of armored building modules 615 having side-lap overhangs and being used to route and protect communications and/or power cables. This triplet comprises third, first, and second building modules 620, 621A, 621B respectively, located side-against-side to create at least part of an armored building panel. The first building module 621A has a first overhanging flange 623A and an opposite second overhanging flange 625A as well as a channel 627A running the length of the building module 621A. (Within this disclosure, a channel is a tunnel unless it is filled with something other than a gas or liquid.) The second building module 621B has a first overhanging flange 623B and an opposite second overhanging flange 625B as well as a channel 627B running the length of the building module 621B. Placing the first and second building modules 621A, 621B adjacent and touching one-another such that the first overhanging flange 623B of the second building module 621B overhangs the second overhanging flange 625A of the first building module 621A creates a channel 629AB. The three building modules each have a similar structure as exemplified in the second building module 621B which includes first and second sides 620B,626B supporting and spacing apart an upper element 622B from a lower element 624B, and wherein the first overhanging flange 623B is an extension of the upper element 622B, and wherein the second overhanging flange 625B is an extension of the lower element 624B. Note that with such structures (621, 621A, 621B), the first building module 621A can be removed from its location between the third and second building modules 621,621B without disturbing the third or second building modules 621,621B. This is accomplished by first lifting the first building module 621A to clear flange 623A from the third building module 621, then shifting the first building module 621A away from the second building module 621B, and finally lifting the first building module 621A completely clear of both the third and second building modules 621,621B. Note also that any of the channels 627A, 627B, or 629AB can be used to route and protect cables, such as communications and/or power cables. For example, FIG. 3 shows a cable 631 routed through channel 627A in the first building module 621A, shows a cable 635 routed along a surface of overhanging flange 625B of the second building module 621B thereby placing the cable 635 substantially within the corner (i.e. within the space of a corner) established by the meeting of flange 625B with the rest of building module 625B, and shows a cable 633 routed through channel 629AB. The cables 631,633,635 may or may not each include an outer protective jacket (as described above for the jacket described in the description of FIG. 2) that provides additional armored protection to that afforded by the building modules 621A and 621B. And it should be noted that the first cable 631, second cable 633, and third cable 635 routed through the building modules 621A,621B can serve as both event sensors and as location sensors should they become damaged or severed when either of the building modules 621A,621B is damaged or destroyed by a terrorist. When a building module housing a cable becomes damaged or destroyed by an event, it is also possible, if the cable becomes damaged too, for the security system 11 to determine the location of such an event. This is because subsystems connected to the cable may become inoperative or operate improperly and will thus be indicators to the security system 11 that those subsystems are located near a region of significant disturbance and are likely the result of a security threat. Power cables, if they are routed through building modules, also serve as continuity sensors and therefore event-location sensors in the same manner as communication cables do.

One aspect of some of the embodiments of the invention is shown in FIG. 3. It is that building modules of the type shown lend themselves, by way of their channels being useful for power and communication wiring, to being instrumented with sensors such as a camera that could be installed as a fixed view camera or a pop-out camera that can be secreted or otherwise hidden within a camera portal 637 such as shown in the first building modules 621A. FIG. 3 shows an element 639 that can be a power supply, a sensor, or other equipment installed within a tunnel.

FIG. 4 shows one possible embodiment of a subsystem 641 such as could be housed within a security barrier 109. A sensor unit 643 is shown having a sensor probe 645 and an antenna 651. The sensor unit 643 is connected to a power supply 647. A communication cable 649 connects into and out of the sensor unit 643 and extends beyond the view both the left and the right of the view. The sensor unit 643 is in communication with other subsystems of the armored security system 11, and this might be automatically and/or remotely selected to be by way of wireless communication using the antenna 651, or by way of communication that uses conductive wire or even wave-guides. In the case of waveguides, the cable 649 could be a fiber-optic cable, or it could represent a microwave wave-guide. FIG. 4 can also be used to illustrate a concentrator subsystem (e.g. such as concentrator subsystem 661 in FIG. 5) instead of the sensor subsystem 641, but without the attached sensor 645. The types of sensors used in various embodiments of this invention can include any that could be used to aid the detection, identification, location, or threat assessment of things and events that could threaten the security of the secure region **105**. Examples include gas sensors, spectrophotometers, acoustic and/or ultrasonically based sensors (e.g. microphones), shot locators, cameras, motion detectors, Doppler sensors, radar, weight sensors, touch sensors, vibration sensors, cable-continuity sensors, optical sensors, electro-magnetic based sensors, capacitance based sensors, resistivity sensors, tension or compression sensors, contact sensors, liquid sensors, level sensors, distance sensors, position sensors, attitude sensors, elevation sensors, rotation sensors, impact sensors, humidity sensors, smoke sensors, fire sensors, heat sensors, temperature sensors, wind sensors, ambient light sensors; GPS sensors, RFID sensors, proximity sensors, trip sensors, laser or microwave beam-break sensors, voltage sensors, current sensors, power sensors, and charge sensors, to name only some. Either or both the sensor unit **643** and/or the sensor probe **645** can include a signal processor. Use of GPS information and the reading of RFID tags by an RFID sensor can of course be used to track and monitor for unexpected situations and movements of known personnel and of assets such as barrier blocks or any components and subsystems of the security system **11** and what it is protecting. Terrestrial triangulation sensors can also be used in addition to GPS sensors, or instead of GPS sensors. If a sensor system (or networked group of sensor subsystems) is deemed failing it can be masked out to avoid its causing false alarms. A sensor subsystem can be put in various modes discreetly. Example modes include repair mode, maintenance mode, test mode, off-line mode, and active mode. In other than active mode, a sensor would not report measurements as real and would not effect (i.e. not make happen) real alarms. When a sensor is put into test mode, engineers can perform end to end testing, and they can enable such a sensor to be marked on a GIS (geographical information system display) that they are in test mode. When a sensor is put into off-line mode, it is caused to be ignored by the rest of the security system **11** entirely. In active mode, a sensor subsystem is deemed to be in proper working order, have passed routine automated or manual validation tests, and will pass alarms and properly interact with active countermeasures in the rest of the security system **11**.

FIG. **5** shows multiple subsystems interconnected (i.e. in communication with one another) by a network comprising branches off of a main shared branch **655**. Sensor subsystems **661**, **663**, and **665** connect to and share a first branch **655**A of the network. Concentrator subsystems **671**, **673**, and **675** connect to and share a second branch **655**B. Monitor and Control subsystems **681**, **683**, and **685** connect to and share a third branch **655**C. And alarm subsystems **691**, **693**, and **695** connect to and share a fourth branch **655**D. The four branches **655**A-D each connect to and share a main branch **655** which is also in communication with (and shared with) other systems or subsystem(s) **657** such as a Network Operations Center (NOC) or even a Tactical Control Center (TOC). Each of the systems (or subsystems) is shown with its own antenna for use in a wireless communication network.

FIG. **6** shows a hierarchical communication network **701** of interconnected sensor subsystems, signal concentrator subsystems, a security monitor and control subsystem, and an alarm subsystem, whereby all subsystems are able to communicate with one-another by way of the network **701**. Sensor subsystems **703**, **705**, and **707** are interconnected with sensor-to-sensor links **1001** and **1003**, and they also connect to first-level concentrator subsystems **801** by means of sensor-to-concentrator links **1015**, **1017**, and **1019** respectively. Sensor subsystems **709**, **711**, and **713** are interconnected with sensor-to-sensor links **1005** and **1007**, and they also connect to first-level concentrator subsystems **801** by means of sensor-to-concentrator links **1015**, **1017**, and **1019** respectively. Sensor subsystems **715**, **717**, **719**, and **721** are interconnected with sensor-to-sensor links **1009**, **1011**, and **1013**, and they also connect to first-level concentrator subsystems **805** by means of sensor-to-concentrator links **1027**, **1029**, **1031**, and **1033** respectively. First-level linked concentrator subsystems **801**, **803**, and **805** are interconnected by concentrator-to-concentrator links **1035** and **1037**, and they also connect to second-level concentrator subsystem **823** by means of first-level-concentrator-to-second-level-concentrator links **1039**, **1041**, and **1043** respectively. Second-level concentrator subsystems **821** and **825** may have links to other first-level-concentrator subsystems which may have links to other sensor subsystems. Third-level concentrator subsystem **877** connects to second-level concentrator subsystems **821**, **823**, and **825** by means of second-level-concentrator-to-third-level concentrator links **1045**, **1047**, and **1049** respectively. Monitor and control subsystem **891** connects to third-level concentrator **877** by means of link **1053**, but may also connect to other third-level concentrators such as **875** and **879** by means of links **1051** and **1055** respectively. Third-level concentrators **875** and **879** may have a hierarchical network below them much as does third-level concentrator **877**. Such networks may connect hundreds of sensors to the monitor and control subsystem **891**, and they may have fewer or more concentrator levels as shown in this figure. Ultimately, the monitor and control subsystem **891** connects via a link **1057** to other subsystems such as an alarm subsystem **899**. The interconnections shown can be by fixed hard-wiring or by fixed wireless channel assignments, or they can be logical and variable through either fixed or dynamic programming.

FIG. **7** shows a high-level view of security components networked together by a private intranet connected to the Internet via a firewall. In this disclosure, each of the rectangles (i.e. each "box") shown in FIG. **7** is to be considered a "component" of the armored security system **11**, as is each group member of a box if that box comprises a group of components. Each of the lines that are shown interconnecting components represents one or more communication links between the components found at the two ends of that line. Any two member components of a group of components may also be interconnected by way of one or more communication links. The sensor network(s) **1523**, in particular, may comprise multiple sensors interlinked communicatively to form one or more networks. FIG. **6** depicts a portion of one possible network of sensors linked into a hierarchy network of concentrators. Each of the components comprises one or more "subsystems".

FIG. **7** also shows that various servers and browsers (and other computers and computer-controlled apparatuses and devices) are connected to a private network **1501** operating as an intranet. The private network **1501** is connected to the Intranet **1701** by way of a firewall **1503**. The Internet **1701** is of course connected to various external servers **1801** and external browsers **1803**, all external to the private intranet **1501**. Some of the external servers **1801** are connected to external devices **1805**. Connected to the private network **1501** are one or more sensor servers **1521**, one or more monitor and control servers **1541**, one or more alarm servers **1551**, one or more countermeasure servers **1561**, one or more Network Operation Center (NOC) servers **1511**, one or more Tactical Operations Center (TOC) servers **1601**, one or more security database servers **1581**, one or more other database servers

1591, and one or more other servers **1571**. Also connected within the private network **1501** are one or more NOC browsers **1513** (which may also be connected directly to one or more NOC servers **1511**), one or more TOC browsers **1603** (which may also be connected directly to one or more TOC servers **1601**), and one or more other browsers **1573**. One or more other devices **1575** may be connected to the one or more other servers **1571**. One or more monitor and control subsystem(s) are connected to the one or more monitor and control servers **1541**. One or more alarms **1553** are connected to the one or more alarm servers **1551**. One or more countermeasure controllers **1563** are connected to the one or more countermeasure servers **1561**. One or more sensor networks **1523** are connected to the one or more Sensor Servers **1521**. One or more autonomous sensors **1533** and/or one or more autonomous sensor networks **1531** may also be connected to the one or more sensor servers **1521**. Any of the one or more autonomous sensors **1533** and any of the one or more autonomous sensor networks **1531** may be connected directly to the one or more alarm servers **1551**.

An individual one of the one or more sensor networks **1523** may comprise concentrators such as first concentrator subsystem **671** shown in FIG. **5** or first first-level linked concentrator **801** shown in FIG. **6** used for converging data and information from many sensors into integrated data and/or information for transmission to one of more of the sensor servers **1521**.

An individual one of the one or more autonomous sensors **1533** may be called "autonomous" for any of at least three reasons. It may be self-powered by an associated power source such as by a battery and/or solar cells or by one or more power-generating device(s) such as those that derive power from a piezoelectric transducer, a thermoelectric transducer, a fuel-cell, or a device that converts ambient electro-magnetic waves into voltage and current. It may be linked without the private network **1501** to one or more alarm servers **1551** and able to use such a link when sensor servers **1521** (or a concentrator such as **801** in FIG. **6**) are not functioning properly. And/or it may include sufficient means to judge when to communicate data and/or information derived from the data. Autonomous sensor networks **1531** can be either networks of autonomous sensors or networks that each collectively has any of the attributes that make an individual sensor autonomous. At least some of the subsystems in embodiments of the invention can work autonomously as a federated group. An example of a federated group would be a group of subsystems that have at least temporarily been cut off from communications with any monitor and control subsystem but are able to recognize that situation and work together to continue their functions and to archive data and information they generate so that it can be later transmitted to a higher-level system (such as a monitor and control subsystem) when it is reconnected. Not all of the subsystems need to be fully on all of the time as some are not first-warning devices, so they can hibernate some of the time. Subsystems in hibernation can be awakened by internal watch-dog timers, or by signals received through a communication interface that remains awake during the hibernation of the rest of the subsystem. Also, with low-level analysis, not all of the sensor data need be transferred to higher-level subsystems.

The one or more monitor and control subsystems **1543** use information obtained through the one or more monitor and control servers **1541** from the one or more sensor servers **1521**, and they use programmed logic and rules to decide when to activate one or more of the alarms **1553** via one or more of the alarm servers **1551** via the private network **1501**.

The one or more NOC browsers **1513** permit user configuration and supervision of the private network **1501** and any of its networked components, some even of which may lie external to the private network **1501** and accessible via the firewall **1503** and the Internet **1701**, but not including any of the TOC browsers **1603** or TOC servers **1601**. The one or more NOC browsers **1513** may have both a direct link to the one or more NOC servers **1511** as well as a link directly to the private network **1501**; this is to enable user control of the NOC servers **1511** even when the private network **1501** is not fully functioning. Under one mode of the invention, user control by way of the NOC browsers **1513** and/or the NOC servers **1511** is provided of sensors in the sensor networks **1523**, the sensor networks **1523** themselves, sensor servers **1521**, autonomous sensors **1533**, autonomous sensor networks **1531**, concentrators (such as **671** in FIGS. **5** and **801** in FIG. **6**), alarms **1553**, alarm servers **1551**, monitor and control subsystems **1543**, monitor and control servers **1541**, countermeasure controllers **1563**, countermeasure servers **1561**, security database servers **1581**, other database servers **1591**, other browsers **1573**, other servers **1571**, other devices **1573**, and even some of the external devices **1805**.

The one or more TOC browsers **1603** permit user configuration and supervision of the one or more TOC servers **1601**, and a direct link to the one or more TOC servers **1601** enables user control of the TOC servers **1601** even when the private network **1501** is not fully functioning. The one or more TOC browsers **1503** and the one or more NOC browsers **1513** enable human communications between the NOC and the TOC. The one or more TOC browsers **1503** also enable access to supervise and even control the one or more countermeasure controllers **1563** by way of the one or more countermeasure servers **1561**, under conditions that would require overriding the NOC.

One aspect of the invention is to provide in its embodiments means to assure that subsystems are all synchronized to the same clock-time. The one or more NOC servers **1511** would each include their own clock as a master reference and would keep their respective clocks synchronized to one another. Each NOC server **1511** can use the Internet, when it is available, to synchronize its own clock to a reliable standard. The one or more NOC servers **1511** can also use NTP (network time protocol) and/or other methods to enable sensor data and recorded information to be accurately time-stamped with times that are synchronized to the master clock of the controlling NOC. This enables accurate time records to be associated with recorded data and information useful, for example, in forensic evaluation, such as when the presence of a noxious gas was detected or when high vibrations by certain barrier modules were experienced. GPS typically provides time stamps, but these time-stamps, if recorded, would be flagged as "suspect event time". The controlling NOC in some implementations constantly looks at all subsystems generating time data to assure that their respective clocks are synchronized to the clock of the controlling NOC, and resets them (i.e. "slams" them) as needed. If a subsystem wakes up or restarts its clock, any data and information it generates before the controlling NOC can slam it, would be flagged with "suspect time", "no time sync verification", or an equivalent flag.

One aspect of the invention is to provide in some of its embodiments one or more duplicated components and/or subsystems which can be activated to provide redundancy and/or backup capabilities. Sufficient automatic control programs and/or alternate human intervention, by way of the NOC browsers **1513** and TOC browsers **1603**, would be included to switch over from the use of a failed or failing component to a duplicate one that is working. This implies that constant checks are made by the NOC servers **1511**, the TOC servers **1601**, the monitor and control servers **1541**, the alarm servers **1551**, the countermeasure servers **1561**, the sensor servers **1521**, the autonomous networks **1531**, the autonomous sensors **1533**, the other servers **1571**, the security database servers **1581**, and the other database servers that their duplicates and connected subsystems are functioning properly or ready to function properly when needed. One aspect of the invention is that subsystems within a group of similar subsystems are made capable of taking over the duties of any of any inoperable or dysfunctional member of the group; this taking over of extra duty can be made to commence or cease by way of commands from a higher-level subsystem (e.g. a monitor and control subsystem, a network operations center subsystem, and/or a tactical operations center subsystem). It can also be made to commence or cease by way of a subsystem checking on the health of other subsystems, and when recognizing another subsystem is inoperable or dysfunctional (i.e. unhealthy), to take over duties that back-up or cover for the unhealthy subsystem. An example of this would be a camera aiming toward a location of an inoperable microphone to ascertain whether there is noticeable any unusual activity going on at that location.

Security databases servers **1581** along with their attached memory devices (not shown) maintain records of the configuration parameters and settings of the armored security system **11**, as well as of historical and current information about system status and sensor information, updated and/or archived routinely at regular intervals as well as asynchronously when event driven. Duplicate security databases **1581** are maintained with copies of the stored information for backup purposes in each member security database. The duplicate members of the security databases **1581** may be located in different geographical locations for security purposes, one of which may be the location **103** of a centralized monitor and control subsystem. Historical data and event records are kept not only as potential evidence for later use in proving those data and events, but also for engineering use to analyze for in improving the responsiveness an accuracy of the automated functions within the security system **11**.

Other database servers **1591** along with their attached memory devices (not shown) maintain records managed by the Tactical Operations Center and/or a site facilities team. Duplicates of the other databases **1591** are maintained with copies of the stored information for backup purposes in each member security database. The duplicate members of the security databases **1591** may be located in different geographical locations for security purposes.

Other browsers **1573**, other servers **1571**, and other devices **1575** that are connected to the other servers **1571** might for example be used by a site maintenance team to monitor and control facilities sensors and equipment, even those not having to do with security. Data and configurations important to those activities are stored in the other database servers **1591** where they can also be accessed by the personnel and systems of the NOC and the TOC.

External browsers **1803**, external servers **1801**, and external devices **1805**, all situated outside the private network **1501** and made available to the private network **1501** by way of the Internet **1701** and its connection to the private network **1501** by way of a firewall **1503** may be used to extend the reach of the armored security system to locations both in the secure area **105** and the unsecure area **107**. The external devices **1805** may include networks of sensors, individual sensors, autonomous sensors, as well as devices such as cellphones, personal digital assistants, personal computers, or personal appliances.

Another aspect of the invention is that any of the communications connections between component groups, between members of the component groups, and between subsystems within members of the component groups of the armored security system **11** may comprise serial and/or parallel path segments each of which may be provisioned with a different communications medium, a different communication technology, or in some cases even a different service provider. This particularly includes connections shown in FIG. **7** as outside the private network **1501** portion that is represented as a cloud, but also those not shown in FIG. **7** but within the private network **1501** portion that is represented as a cloud. The use of parallel paths (e.g. redundant paths) using different media results in overlapping networks (i.e. networks with logically-overlapping, redundant, paths) and adds much to the robustness of the security system. Examples of various communications media include airwaves, fiber-optics, and conductive wire or cables. Fiber-optics and conductive wire or cables are examples of "wired" communications media that are referred to herein as "guiding media", whereas airwaves are used for wireless communications. Examples of various communications link technologies include dedicated lines, shared lines, automatically switched lines, satellite links, telephone communication, cell-phone communication, wireless networking, short-range wireless communication, long-range wireless communication, medium-range wireless communication, laser-beam communication, acoustic communication, ultrasound communication, long-wave communication, short-wave communication, microwave communication, millimeter-wave communication, broadcast communication, and power-line communication. Some of these communication link technologies may provide multiple channels. Examples of various communications technology attributes include analog modulations, pulse modulations, digital modulations, synchronous clocking, asynchronous clocking, handshaking, packet switching, CDMA, TDMA, FDMA, error detection and/or correction methods, physical and electrical interfacing standards, encryption, and methods of secure identification of sender and/or recipient.

Another aspect of the invention is that any of the messaging accomplished over the connections between component groups, between members of the component groups, and between subsystems within members of the component groups of the armored security system **11** may be by way of dynamically changed paths, channels, and/or other communications technologies including communications link technologies and communications technology attributes. This particularly includes connections shown in FIG. **7** as outside the private network **1501** portion that is represented as a cloud, but also those not shown in FIG. **7** but within the private network **1501** portion that is represented as a cloud. The switching between various selected channels, paths, and/or other provisioned communications technology may be made according to systematic rules or selected randomly among those provisioned. For example packet communication could include and use within a packet header notification with information regarding which channel, path, or other communications technology attributes will be used for the next packet. Duplicated versions of a message may be sent using distinctly different channels, paths, and/or communications technology attributes, and the received versions with the most matches at a common destination could be accepted as best representing the original message. Or a message with no match at a common destination could be resent using different selections of paths, channels, and/or communications technology attributes until redundantly transmitted and received messages match. These techniques amount to what may be referred to in this disclosure as "diversity messaging" (or "diversity signaling"), diverse in paths, channels, and/or communication technology attributes. Combination of diversity messaging with dynamic changes of channels, paths, and/or communications technology attributes may be referred to in this disclosure as "dynamic diversity messaging" (or "dynamic diversity signaling"). Communications of finite duration from a computerized sensor to a computer in another subsystem can be made to begin at pseudo-randomly chosen times, and these may be known in advance by both the computerized sensor and that other computer. And switching from one communications medium to another communications medium may occur at times known in advance by both a sender and a receiver using those media. Some of the motivations for using diversity messaging (or dynamic diversity messaging) in communication include: a) reducing the possibility of an interruption in communication caused by terrorist activities, b) increasing the difficulty of preventing messaging and signals from reaching their intended targets correctly, c) providing alternative choices for a connection when conditions may degrade some choices but not others, d) enable continued communications when some communication choices are unavailable due to maintenance activities, and e) enable message comparisons between redundant connections to detect and correct communication errors which simple parity checks can not accomplish. When some communication paths become inoperable, others that remain operable can maintain needed communications. As is described in the next paragraph, provisioned communications paths, channels, and/or communications technology attributes not being used for needed communications can be used in the meantime to carry misinformation in order to confuse eavesdroppers.

FIG. **8** shows an example of multiply diverse communication connections between a small set of subsystems. The subsystems include three sensor subsystems **703**, **705**, and **715** along with two concentrators **801**,**823** and a monitor and control subsystem **891** creating a hierarchical structure somewhat similar to that shown in FIG. **6**. Communication connections which might otherwise have been shown as a single line drawn between any two of these subsystems are instead drawn here as multiple lines each indicating an available communication medium, path, and communication technology for use in carrying data, information, and/or other messages from one subsystem at one end of the line to the subsystem at the opposite end of the line. In this drawing, the communication connections comprise the following: balanced twisted pair **1901**, **1905**, **1911**, **1915**, and **1935** through tunnels within concrete barrier modules; Ethernet on Cat-5 cable **1903**, **1909**, **1929**, and **1937** through tunnels within concrete barrier modules; short-range wireless **1907**, **1927**, and **1939**; fiber-optic cable **1913**, **1925**, **1933**, and **1943** through tunnels within concrete barrier modules; fiber-optic cable **1917** and **1949** NOT through tunnels within concrete barrier modules; satellite link **1921**; and cellular phone link **1945**. The other communications connections **1919**, **1923**, **1931**, and **1947** can be additional ones of these previous combinations of available communication media, paths, and communication technologies. Not illustrated in the drawing, but implicit in the use of diversity messaging in this invention, is the choice within some transmission technologies of choosing channels such as among available frequencies, time slots, and/or CDMA codes. Communication paths and channels that are not being used at any one time can be used to transmit misinformation so as to fool any eavesdropper(s), or even to provide information that would help to entrap such eavesdropper(s). With coordination and/or secure identification of messages containing real information (i.e. information that is not misinformation), communications of real information and misinformation can be interleaved on any given path or channel available to the armored security system.

FIG. **9** shows a flow chart of a method of sensor data collection **2001** used by a sensor subsystem to receive and store **2005** new data from its sensor device, to analyze **2011** the data for information, and to communicate (i.e. transmit **2013**, **2015**) information to a working targeted recipient or an alternate target. The method **2001** would be carried out by a processor executing a stored program (stored on a computer readable medium) and in communication with at least one sensor unit (e.g. the sensor unit **643** shown in FIG. **4**, the sensor subsystem **661** shown in FIG. **5**, or the sensor subsystem **703** in FIG. **6**) and with a targeted receiver of sensor information such as another sensor (e.g. the sensor subsystem **663** shown in FIG. **5** or the sensor subsystem **705** in FIG. **6**), a concentrator (e.g. the concentrator **671** in FIG. **5**, or **801** in FIG. **6**), or a monitor and control system (e.g. the monitor and control subsystem **1543** in FIG. **7**, **891** in FIG. **6**, or **681** in FIG. **5**). The processor and stored program might be part of a sensor unit (i.e. sensor subsystem). Following a start **2003** of the method **2001**, data from at least one sensor (e.g. the sensor unit **643** in FIG. **4**) would be received and stored **2005**. Part of the receive and store step **2005** might include changing the rate at which sensor data is acquired, as for example when a threat has been detected and a higher rate for more information is desirable, a lower rate for energy conservation, a lower data-rate for bandwidth conservation, or greater stealth is desirable. It also might include a decision to archive data in the data storage memory **5007** when it may be called upon for forensic purposes or for evidence following a terrorist incident that might have cut-off the sensor subsystem from the rest of the security system. Such archived data, archived on a local basis, can enable uploads of the data on an as-required basis by higher-level subsystems. A first test **2051** would be made to check whether it is time to calculate short-term statistics **2007**, and if so to do so. If it is not time to calculate short-term statistics, or if such statistics have just been calculated, then a second test **2053** would be made to check whether it is time to calculate long-term statistics **2009**, and if so to do so. If it is not time to calculate long-term statistics, or if such statistics have just been calculated, then the stored data (including real data and/or any recently calculated statistics are analyzed **2011** for indications that there may be a threat indicated in the data or its statistics. This analysis **2011** may include trend analysis to discover meaningful deviations from expected norms, and it may include looking for unexpected deviations or deviations having a low probability of expectation. After this analysis is made, a third test **2055** would be made to check whether it is advisable to communicate (e.g. transmit) discovery of meaningful deviations in the sensor data and/or statistics to a concentrator of sensor information, and if not to return to step **2005** to receive and store more new data. Meaningful deviations could be anything outside of expected limits, for example two-sigma statistical limits about a mean of purely random behavior. The test **2055** would also check the priority of the sensor's information compared to that of other sensors attempting to utilize the same communication bandwidth(s), because priorities can change, and would give communications priority to those other sensors when they have a higher priority. And if an advisory is under effect from a higher-level subsystem or NOC to reduce bandwidth utilization, as when under a heightened terrorist alert, the test **2055** may use a rule to decide upon the frequency of information reporting. If it is time to transmit the data and/or statistics, then a fourth test **2057** is made to check whether a preferred concentrator subsystem is working properly **2015**, and if so to do so. Such a preferred concentrator subsystem is normally one that is at a next higher level in a hierarchy of data and information collection, the hierarchy starting with sensor subsystems at the lowest level, followed by concentrator subsystems at one or more higher level(s), and reaching to a monitor and control subsystem at an even higher level. If the preferred (i.e. targeted) higher-level subsystem is not working properly, then the data and/or information is transmitted **2013** instead to an alternative recipient. However, as disclosed farther below the preferred or targeted recipient, under conditions of a detected or possible threat, or of a detected or otherwise known inability to operate properly, may be made another sensor, a different concentrator, or a different monitor and control subsystem.

FIG. **10** shows a flowchart of a method **3001** used by a concentrator subsystem to receive **3005** information and data from sensor subsystems, to analyze **3007** the information and data collectively for threat information, and to communicate **3009**,**3011** that threat information to another working concentrator subsystem or to a monitor and control subsystem. The method **3001** would be carried out by a processor executing a stored program (stored on a computer readable medium) and in communication with at least one sensor unit (e.g. the sensor unit **643** shown in FIG. **4**, the sensor subsystem **661** shown in FIG. **5**, or the sensor subsystem **703** in FIG. **6**), and with at least a monitor and control system (e.g. the monitor and control subsystem **1543** in FIG. **7**, **891** in FIG. **6**, or **681** in FIG. **5**) or another concentrator subsystem (e.g. the concentrator subsystem **673** shown in FIG. **5** or the concentrator subsystem **823** in FIG. **6**). The processor and stored program might be part of a concentrator subsystem. Following a start **3003** of the method **3001**, information from one or more sensors (e.g. the sensor unit **643** in FIG. **4**, the sensor subsystems **661**,**663**,**665** shown in FIG. **5**, or the sensor subsystems **703**,**705**,**707** in FIG. **6**) or from one or more concentrator subsystems (e.g. in FIG. **6**, concentrator **823** could receive from concentrators **801**,**803**,**805**) would be received and stored **3005**. Following the receipt of that information, it would be analyzed **3007** for threats. Concentrators have an advantage over single sensor subsystems in that they can analyze sensor information received from more than a single sensor, and can thereby inspect for trends and unexpected behaviors with a greater sensitivity for detecting actual threats as well as a greater ability to infer new information. For example, if a concentrator detects that multiple sensors in a given physical location are all revealing unexpected behavior, it becomes more probable that there is a real cause to that behavior, and may also infer that the threat is affecting more than a single location. Also for example, if a succession of sensors separated distances from one another reveals a succession of unexpected behavior displaced in time differently from one another, that data may be analyzed to reveal a direction and speed of movement of a threat, be it movement of an object or a cloud of gas. After this analysis is made, a first test **3051** would be made to check whether it is advisable to communicate discovery of meaningful analysis results to another concentrator subsystem or monitor and control subsystem, and if not to return to step **3005** to receive and store more new information. Meaningful deviations could be anything outside of expected limits, for example two-sigma statistical limits about a mean of purely random behavior. The test **3051** would also check the priority of the sensor's information compared to that of other sensors attempting to utilize the same communication bandwidth(s), because priorities can change, and would give communications priority to those other sensors when they have a higher priority. And if an advisory is under effect from a higher-level subsystem or NOC to reduce bandwidth utilization, as when under a heightened terrorist alert, the test **3051** may use a rule to decide upon the frequency of information reporting. If it is time to transmit the analysis results, then a second test **3053** is made to check **3053** whether a preferred targeted recipient (e.g. a concentrator subsystem at a higher level) is working properly, and if so to transmit **3011** the information to the targeted recipient. Such a preferred concentrator subsystem is normally one that is at a next higher level in a hierarchy of data and information collection starting just above sensor subsystems at the lowest level, to concentrator subsystems at one or more higher level(s), and reaching to a monitor and control subsystem at an even higher level. If the preferred concentrator subsystem or monitor-and-control system is not working properly, then the analysis results are transmitted **3009** instead to an alternative concentrator subsystem or monitor and control subsystem. The alternative concentrator subsystem could be at the same level in a hierarchy. However, as disclosed farther below the preferred or targeted recipient, under conditions of a detected or possible threat, or of a detected or otherwise known inability to operate properly, may be made a different concentrator or a different monitor and control subsystem.

FIG. **11** shows a flow chart of a method **4001** used by a monitor and control subsystem to receive information from concentrator subsystems, to analyze that information for threats, to control alarms, and to take countermeasures. The method **4001** would be carried out by a processor executing a stored program (stored on a computer readable medium) and in communication with at least one sensor unit (e.g. the sensor unit **643** shown in FIG. **4**, the sensor subsystem **661** shown in FIG. **5**, or the sensor subsystem **703** in FIG. **6**) by way of zero or more concentrator subsystems (e.g. the concentrator subsystem **671** shown in FIG. **5** or the concentrator subsystem **823** in FIG. **6**), and with at least a monitor and control system (e.g. the monitor and control subsystem **1543** in FIG. **7**, **891** in FIG. **6**, or **681** in FIG. **5**). The processor and stored program might be part of the monitor and control subsystem. Following a start **4003** of the method **4001**, information from at least one sensor (e.g. the sensor unit **643** in FIG. **4**, the sensor subsystem **661** shown in FIG. **5**, or the sensor subsystem **703** in FIG. **6**) or from at least one concentrator subsystem would be received and stored **4005**. Following the receipt of that information, it would be analyzed **4007** for threats. After this analysis is made, a first test **4051** would be made to check whether alarm conditions are present in the information, and if not to reset alarms and return to step **4005** to receive and store more new information. If alarm conditions are met, then alarms are activated (ON) **4011**, after which a second test **4053** is made to check whether countermeasures are justified, and if so to activate the appropriate countermeasures **4015** and return to step **4005** to receive and store more new information, or if not to reset (turn OFF) **4013** the countermeasure(s). Typically countermeasures would be taken by one or more subsystems which have the capability to control themselves once activated to ON, and can turn themselves off once the threat condition that warranted their use was no longer a threat.

FIG. **12** shows a computer subsystem **5001** in block diagram form representing a computing engine and associated components, various combinations of which can be used for various components and subsystems in embodiments of the invention. The computer subsystem **5001** shown comprises a central processing unit (CPU) **5003** in communication connection with program memory **5005**, data storage memory **5007**, a user interface **5009**, any number of communication interfaces **5011**, any number of security system components and/or subsystems **5013**, a power supply **5015**, one or more RF Transceivers **5017**, a Global Positioning System (GPS) device **5019**, a radio-frequency identification device (RFID device) **5021**, and any number of other devices **5023**. The program memory (which is a non-transitory, tangible computer readable storage device) can contain program instructions which the processor can use to execute such routines as a signal processor, a sensor tester, a sensor calibrator, a sensor tuner, a driver, a message sender, a message receiver, a communication stack protocol, an encrypter, a decrypter, an authenticator, a threshold comparer, an inference engine, a statistical analyzer, and other instructions by which to execute rules and other routines necessary to carry out the functions described for various subsystems. The user interface **5009** can comprise a graphical user interface (GUI) or other human interface devices such as a keypad or keyboard, a touchscreen, one or more knobs, one or more pushbuttons, and any of a variety of one or more LED's, numeric displays, and/or other display devices. Such a user interface may permit maintenance, service personnel, and/or others to access the workings of a subsystem by requiring entry of a security code, user name, and/or password. Such use and entry may also be required to correlate in time within a pre-scheduled event period entered at a higher-level subsystem such as a NOC. Any use and entry made in this fashion, in some embodiments, is logged and transmitted to the controlling NOC for creating an audit trail, and this trail would include any failure messages and acknowledgements from message recipients. The user interface **5009** may also serve as a mini-NOC user interface, in some embodiments, on one or more of the possible subsystem in the security system **11**. A minimum set of subsystem elements comprised by a computer subsystem **5001** would include at least the CPU **5003**, the program memory **5005**, the data storage memory **5007**, the power supply **5015**, and at least one of the communication interfaces **5011**. One notable use for the data storage memory **5007** is for archiving data that can thereafter be made available for forensic purposes or evidence following a terrorist incident that might have cut-off the sensor subsystem from the rest of the security system. The one or more communications interfaces can be of any kind. The security system components and subsystems **5013** can be any one or more of sensor subsystems (autonomous or not), concentrator subsystems (autonomous or not), monitor and control servers, alarm servers, countermeasure servers, network operations center servers, tactical operations center servers, or other servers or devices. Any or all of the communications interfaces **5011** can be used to communicate data and/or control signals, and any or all of the communications made over these interfaces can be encrypted and require the exchange security identification signatures and/or codes. The power supply **5015** can be a dedicated one or can be a shared source of power as from a power distribution system, or from a back-up power system. The power supply **5015** could be solely or partly comprised of a solar cell, a fuel cell, a chemical battery, or a generator of power operating off of wind, thermal differences, mechanical vibrations, or ambient electro-magnetic waves. Any energy storage component of the power supply **5015** could be rechargeable by way of inductive coupling to a charging source. The RF transceiver **5017** can be of any type and can even be a transceiver of other than radio-frequency electromagnetic signals, for example of light or sound signals. A GPS device **5019** can provide location information which the CPU **5003** can communicate by way of the transceiver **5017** or the communication interfaces **5011** to other security components. GPS information can be used to keep track of the location of the computer subsystem **5001**, and can be used to provide location information useful in locating a security threat. Falsified GPS information can also be used as purposeful misinformation for stealth and deception as when advantageous to protect the security of the secure region **105**. An RFID device **5021** can provide identification information of the computer subsystem **5001** independently of identification information stored within the data storage memory **5007** or program memory **5005**, and can provide identification information directly to external devices that come within the proximity of the RFID device. Other devices **5023** can include such devices as a sensor probe, a watch-dog timer, a snooze or sleep timer, a disturbance emitter, a signal processor, or a weapon. RFID devices can also be controlled to provide deceptive information when advantageous to the security of the secure region **105**.

Various embodiments of the invention include means that are sensory, adaptive, stealthy, and/or autonomous. For example, within FIG. **9** and FIG. **10**, the steps **2015** and **3011** to "transmit information to a targeted recipient" can have the targeted recipient changed to other than a default preferred targeted recipient. Reasons for such a change may include that a first preferred targeted recipient is temporarily under maintenance or being repaired, is damaged, or is suspected to be compromised by terrorist activity. Other reasons for such a change may be that by doing so may confound eavesdroppers by effectively re-routing information from normal routes. But such changes in the routing of information (e.g. messages) aren't limited to routings between sensors, concentrators, and monitor and control systems. Such changes can extend to changing from otherwise expected routes used between any of the other component subsystems comprised by the security system **11** or shown in FIG. **1** or any of FIGS. **5-7**. With the help of FIG. **8**, it can also be appreciated that embodiments of the invention may involve the purposeful changing of media, communication link technologies, and/or communications technology attributes dynamically in order to make eavesdropping more difficult. If a localized threat is perceived (correctly or not) by the security system **11**, routings can be changed in order to route as much communication away from the location of the perceived threat. As mentioned above, misinformation may also be purposefully transmitted on any of the communication connections for deceiving eavesdroppers, and especially may be utilized and focused to communication routes in the vicinity of a perceived threat that may appear localized. Also as mentioned above, subsystems of the security system **11** may be given autonomous means to enable them to continue operating to collect, analyze, and act independently of other system components which may be temporarily inoperative. As mentioned above in the description of FIG. **1**, embodiments of the invention may include the use of decoys (e.g. mis-information honey-pots) to lure and/or trap those who attempt to breach security of the security system **11**. Examples of decoys that can be part of an embodiment of the invention include a sensor **211** hidden in a plant or disguised as a plant, a sensing subsystem or device **213** that is real or masquerading as real, and a sensor subsystem **217** hidden in a tree (or disguised as a tree). Any sensor, device, or event that purposely provides or causes misinformation (or that is a purposefully inoperable countermeasure subsystem) may serve as a decoy in the present invention. Some decoys of the current invention may be a device, communication, or event that can distract in order to conceal what is desired to be kept secure, or in order to distract terrorists or other potential assailants) away from the secure area **105**. Such decoys can be completely passive or they can be active and even autonomous. A decoy within an embodiment of the invention can also be more than a single subsystem or device; for example, a decoy can be two or more sensors and/or countermeasure subsystems (and/or communications) coordinated in their locations and actions. For example, a surveillance camera **153** can be made to observe activity near to the decoy subsystem **213** (see FIG. **1**), and a countermeasure subsystem (such as gun **163**) may in reaction be automatically aiming toward the decoy subsystem **213**, all while communicating audible warnings to the potential terror suspect. An example of stealth within an embodiment of the invention is that of dynamically changing the routing and/or normal sequence of successive messages (or information) being transmitted from one system component to another.

FIG. **13** shows a flow chart of process steps within a method used by some embodiments of the invention to make inferences. These inferences may be based on sensor data or on other data or information available to an embodiment of the invention. The software to execute the analysis steps described under the descriptions of FIGS. **9**, **10**, and **11** above are stored in program memory **5005** available to a processor (CPU) **5003** as depicted in FIG. **12** above. FIG. **13** shows some steps that may be included in these analysis steps for analysis of sensor data and information through to deducing and inferring new information useful in detecting a terrorist threat, or other threats on the security site **101**. Such analyses and deductions might include the use of deduction and inference rules stored within program memory **5005** or within data storage memory **5007**. A typical deduction and inference method **6001** (or process) is shown in FIG. **13** to begin with a start **6003** followed by a step **6005** to gather a collection of sensor data with its associated data and information. This is followed by a step **6007** to apply deduction and inference rules to the collection. This is followed by a step **6009** to draw inferences. This is followed by a step **6011** to communicate inferences to other subsystems, most typically a higher-level subsystem in a hierarchy, or directly to a monitoring subsystem (which may be a monitoring and control subsystem). Finally the method can end **6013**. One example of such a deduction and inference would be that an object is moving along the length of the barrier wall if sensors within a succession of barrier modules displaced from one another along a common direction pick up a respective succession of disturbance signals with increasing time from one barrier module to the next along the succession of barrier modules. Other examples of a deduction and inference would be a) that a potential threat exists at a specific barrier module having a specific barrier module identification value or GPS-reported location if a sensor within that barrier module detects a disturbance from a norm, but no other nearby sensors detects any disturbances from their respective norms; b) that a vehicle is close to a given barrier module if a spectrophotometer within that barrier module detects one or more above-average signals of the type of gas component(s) expected from a vehicle; c) that a noxious or lethal gas is moving in a given direction if a spectrophotometer detects the gas and a wind indicator detects wind blowing in that given direction; d) that someone is attempting to eavesdrop on communication from a given sensor subsystem, if that communication produces different data being received by any recipient of that data from different communication paths or channels; e) that a terrorist is moving a sensor (or decoy sensor) if the GPS position information coming from it is changing while no prescheduled maintenance is due at the time for that decoy; f) that at least one barrier module has been displaced (given an indication that its GPS coordinates have changed) by a terrorist's attempt to break through the barrier, but that the attempt was apparently unsuccessful because communication by way of a cable running through the tunnels of the barrier modules is still operative, and g) that an attacker has disabled sensors and/or security components (or their subsystems) by damaging or disconnecting one or more sources of electrical power. On a simpler note, sensor subsystems on, within, nearby, or otherwise near enough to have a range that reaches barrier modules of the security barrier **109**, collectively provide the security system **11** (i.e. its NOC and TOC centers) with a constant forensic heartbeat on status of its health and alarms, on maintenance issues, moisture detection, unusual power usage, loss of subsystems, etc., any and all of which can be graphically displayed in an organized manner (e.g. utilizing a geographical information system or GIS) at least on NOC browsers **1513** and TOC browsers **1603**.

FIG. **14** shows a flow chart of a method **7001** used by a sensor subsystem to actively participate in learning improved analysis and decision rules for use in detecting disturbances that could indicate a threat condition, as well as to obtain corroboration(s) from other sensors when potentially meaningful disturbances are detected). The method **7001** could be included within the analysis step **2011** of the method described in FIG. **9**, but wherein the collect new data step **7005**, and the send alarm notice step **7025**, would no longer be needed in this method **7001**. The method **7001** begins at a start **7003**, followed by the step to collect new data **7005**. The collect new data step **7005** is followed by a test **7007** which checks whether the sensor subsystem has received authority to change threshold(s) to be used in the analyze step **7011**. The analyze step **7011** follows step **7007** immediately if the authority has not been received. If the authority has been received, a step **7009** is taken to set new threshold(s) before going to the analyze step **7011**. The granting or denial of authority which may or may not be received is that coming from a higher-level subsystem to which the sensor has previously made a request for authorization. The analysis step **7011** checks whether the currently obtained or received data exceeds normal thresholds for normal ambient conditions or not. The method **6001** previously described can be at least part of this analysis step **7011** but wherein its final step **6011** to communicate inferences to other subsystems may or may not be performed depending upon secondary objectives of the analysis in step **7011**. After this analysis step **7011**, a test **7013** is made of whether the new data indicates new behavior not previously recorded. If such behavior is noticed, then characterizing parameters (and even the raw data such as images from a camera) are saved in the step **7015** to save behavior parameters, and to request authority from a Monitoring and Control subsystem to use these parameters next time in its analyze step **7011**. Whether new behavior is experienced or not, these steps are followed by a test step **7017** to check whether the new data has crossed critical thresholds. The method **7001** ends **7027** if no threshold has been crossed, but continues to a step **7019** to request corroboration from other subsystems if at least one threshold has been crossed. Of particular note, the request corroboration step **7019** can not only request reports from one or more other sensors, but can effect induced disturbances which may add to the strength of a sensor's signals. These induced disturbances can be caused by directives from the sensor (or a concentrator, or an NOC) to activate certain countermeasures (or emissions from other subsystems such as instances of a boundary sentry **8017** described with respect to FIG. **15** below). The induced disturbances may be purposefully timed to be before or during the one or more other sensors' collection of that new data. If the induced disturbance(s) is/are unexpected in an absence of an intruder, then the validity of the original sensor data is confirmed as indicating a potential threat, or otherwise as not indicating a potential threat. Step **7009** is followed by a test step **7021** to check whether or not corroboration has been received from another subsystem. If corroboration has not been received, then step **7023** adds a condition to an alarm notice to that effect. In either regard, the following step **7025** is that of sending the alarm notice to a higher-level subsystem. Following step **7025**, the method **7001** ends at **7027**.

FIG. **15** shows a diagrammatic plan-view representation of a security site **8001**, a portion of the site **8001** of which was more fully shown in perspective in FIG. **1** as security site **101**. An outer zone **8003** is unprotected by the site **8001**. A buffer zone **8005** is situated between the outer zone **8003** and a protected zone **8009**. An entry gate zone **8007** shows a place of secured access for people and vehicles moving between the buffer zone **8007** and the protected zone **8009**. Within the protected zone **8009** and representing portions of the protected zone **8009**, are three other zones: a first special zone **8011**, a second special zone **8013**, and a third special zone **8015**. At one or more locations at the boundaries between zones, a border sentry **8017** (represented as a circle) and/or a check station **8019** (represented as a square) is/are shown. A first security center **8021** is located within the second special zone **8013**. A second security center **8023** is shown located outside the buffer zone **8005**. A first boundary **8025** is shown separating the outer zone **8003** from the buffer zone **8005**. A second boundary **8027** is shown separating the buffer zone from the protected zone **8009**, however a gap in the boundary between the buffer zone **8025** and the protected zone **8009** is occupied by an entry gate zone **8007** which is itself partially bounded by a third boundary **8029**. This second boundary **8027** would be defined by placement of a row of armored barrier modules and is depicted within FIG. **15** as a thicker line than used elsewhere in the drawing. Side boundaries of the entry gate zone **8007** may also comprise armored barrier modules, so those (such as third boundary **8029**) are drawn with the same thicker line. The first special zone **8011** within the protected zone **8009** is bordered by a fourth boundary **8031** and a fifth boundary **8033**, wherein the fifth boundary **8033** is a gap within the fourth boundary **8031** and serves as an entrance and exit gateway to and from the first special zone. The fourth boundary **8031** may, for example, comprise a high-voltage fence or a high armored wall on a high embankment around the first special zone **8011**. The second special zone **8013** within the protected zone **8009** is bordered by a sixth boundary **8035** which may comprise, for example, a high reinforced concrete wall, as well as one or more security-guard guarded entrance and exit door(s). The third special zone **8015** within the protected zone **8009** is bordered partially by a seventh boundary **8037** and partially by a portion of the second boundary **8027**, wherein the seventh boundary **8037** may be, for example, a chain-link fence with locked entrance and exit gates. A person **223** is shown standing in the buffer zone **8005** not far from the entry gate zone **8007**. The person is shown carrying one or more personal device(s) **8039**. The First Security Center **8021** and the second security center **8023** are each shown with a radar antenna **8041**.

In some embodiments of the invention, no level of security clearance may be required for a person, vehicle, or other equipment to be within the outer zone **8003** shown in FIG. **15**. The level of security clearance required to be in the buffer zone **8005** may be low but requiring at least some minimum show of credentials. The level of security clearance required to be within the entry gate zone **8007** can be higher than that of the buffer zone **8005**, but a still higher level of security clearance is normally required within the protected zone **8009**. A still higher level of security clearance could be required within the first special zone **8011**. Between the levels of security clearance required to be within the protected zone **8009** and also within the first special zone **8011**, can be intermediate levels of security clearance to be within other special zones such as the second special zone **8013** and the third special zone **8015**. This example might be appropriate for a nuclear power plant where the power generation facility is within the first special zone, the management and staff offices within the second special zone **8013**, and the maintenance yard within the third special zone **8015**.

FIG. **15** shows multiple instances of the use of a border sentry **8017** (represented as a circle) and/or a check station **8019** (represented as a square) at the boundaries between zones. Numerous instances of a border sentry **8017** are shown on each boundary, with those on each boundary somewhat uniformly distributed apart from one another along the entire length of that boundary. Not far from each instance of a border sentry **8017** can be found an instance of a check station **8019**. A border sentry **8017** is a type of disturbance emitter and can emit some form of communication (such as one or more audible voice announcements and/or warnings, distractingly loud noises, or bright flashes of light) that would normally be noticed by an intruder or by a non-hostile person detected by one or more of the sensor subsystems of the security system **11**. Depending upon the situation of how much the security system **11** may be able to determine about a suspected intruder, the security system **11** has the option to activate any given instance of a border sentry **8017**; the option to reveal to a suspected intruder that he has been discovered (in certain locations) may be important especially if lethal countermeasures may be employed. Announcements, warnings, or instructions, when given would be given in multiple languages depending on the region. The announcements may provide instructions to check-in at a specific instance of a check station **8019** or just a nearby instance of a check station **8019**. In some situations where foul play is suspected, the information given out by an instance of a border sentry could be purposefully false information designed to confuse an intruder. An instance of a check station **8019** is a means for a person receiving such a communication to check in with the security system **11** that they have the appropriate security clearance to be within the zone they are currently, or that they have the appropriate security clearance to approach and enter the next zone requiring the next higher level security clearance. The check-in process may involve a series of challenges for correct responses such as for a password, for an iris scan, for the person's weight, for the person's name, or other shows of identity and/or credentials. These instances of a check station **8019** may utilize the same diversities in communication with the rest of the security systems networks as other subsystems within the security system **11**. Just inside the entry gate zone **8007** is shown an instance of a check station **8019** that would be associated with two instances of a border sentry **8017** found one on each side of the entry gate zone **8007**; it is usual that this instance of a check station **8019** would be attended by one or more security guards to double-check and assist persons entering or leaving the protected zone **8009**. The person **223** shown standing in the boundary zone **8005** is shown carrying one or more personal devices **8039**; these personal devices may, for example, be one or more of the following: a GPS device, an RFID device, a cell-phone, a secure-ID card, or any wireless device that can help to identify the person to the security system **11**. Any one or more of these devices may be required, or may just serve to help the person **223**, to check in or register with any given instance of a check station **8019**, and some may aid in permitting the security system **11** to physically and/or logically track the movement of the person about the security site **8001**. These personal devices **8039**, in addition to a person's registering with the instances of a check station **8019**, can permit a person **223** to safely cross into a zone of next higher security, but their entry may still be cautionary and produce accorded alarms as relating to a person with assumed adequate credentials, but not fully assured as being legitimate. Within this disclosure, the aforementioned boundary system utilizing instances of a boundary sentry **8017** and a check station **8019** to afford a person's safe passage through both hard and soft boundaries to zones of increased security level can be referred to as a "MOATS" system, where "MOATS" is an acronym for "monitored-offensive-automated-threat-system.

As seen in FIG. **15**, radar and any other sensor device and subsystem for monitoring air-space above and around the security site **8001** may be made a part of the security system **11**. The first security center **8021**, within the second special zone **8013**, is shown to include a radar antenna **8041**, as is the second security center **8023** shown outside the buffer zone **8005**. A radar subsystem using one or more instances of a radar antenna **8041** can give the security system **11** the capability of detecting and tracking the location and motion of one or more ground targets as well as targets in the air, and wherein the target may be a suspected terrorist perhaps in a vehicle or airplane or even on foot.

The security system **11** protecting the security site **8001** shown in FIG. **15** may include failsafe features. Sensor and countermeasure subsystems that fail can be made to automatically become inoperative should self-checking of their operating health fail to reset a hold on a respective automatic shut-down function. In addition subsystems such as sensor subsystems, concentrator subsystems, countermeasure subsystems, and network operation centers, can check the health of one-another through back-and-forth messaging to request transmissions of information that would be sufficient to guarantee that the other subsystem is continuing to be operational and in good health. (Within this disclosure, what is meant by a subsystem's health is that its software and hardware operate as they were designed to operate.) Other examples of fail-safe design within embodiments of the invention may include the ability of one or more security centers (like the second security center **8023**) situated outside the security site **8001** to continually check on the health of the security site **8001** and security system **11** by means of communications with the first security center **8021** (that would include an NOC and perhaps a TOC), and to back-up or take over the full or partial roll of the first security center **8021** when necessary, or even to control the security system **11** to shut it and its subsystems down completely (even its autonomously operating subsystems) should it be found that no human operators are present and responsive at the security site **8001**. Automatic weapons controlled by the security system **11** (and autonomous weapons which are part of the security system **11**) can be made to shut down and become locked by respective fail-safe watch-dog timing functions and their associated apparatuses if the weapon subsystems don't continue to generate signals required to keep themselves alive, and the weapon subsystems don't continue to receive keep-alive signals from higher-level subsystems in the security system **11**. Such a situation could result, for example, if no human security persons are alive on the security site **8001** and/or no external security center (such as the second security center **8023**) are/is controlling the security system **11**. Another fail-safe feature of some of the embodiments of the security system **11** is that of being able to shut down the security of the system by boundaries, for example starting first with subsystems at the first boundary **8025**, then the second boundary **8027**, then the third boundary **8029**, the seventh boundary **8035**, the sixth boundary **8033**, and the fifth boundary **8031** in succession.

Although the methods for collecting and analyzing sensor data for information meaningful in detecting a terrorist threat to a secure region **105** at a secure site **101** (and **8001**) are described as being comprised of various steps (e.g. method of sensor data collection **2001**, method **3001** used by a concentrator subsystem, method **4001** used by a monitor and control subsystem, method **6001** used in making deductions and inferences, and method **7001** used by a sensor subsystem to actively participate in learning improved analysis and decision rules as well as to obtain corroboration(s) from other sensors when potentially meaningful disturbances are detected), fewer or more steps may comprise the process and still fall within the scope of various embodiments.

Several embodiments are specifically illustrated and/or described herein. However, it will be appreciated that modifications and variations are covered by the above teachings and within the scope of the appended claims without departing from the spirit and intended scope thereof. For example, communications links between various subsystems can use any of various interfacing methods and protocols (and/or various encryption methods) and be arranged in various other networking architectures; communications networks may overlap one-another; analysis steps can reset data and information memory; and monitor and control subsystems can report to higher level systems such as a Tactical Operations Center and a Network Operations Center at the same site or at sites different from the site hosting the armored security system. Method steps described herein may be performed in alternative orders. Various embodiments of the invention include programs and/or program logic stored on non-transitory, tangible computer readable media of any kind (e.g. optical discs, magnetic discs, semiconductor memory). System structures and organizations described herein may be rearranged. Various embodiments of the invention can include interconnections of various types between various numbers of various subsystems and sub-components. The examples provided herein are exemplary and are not meant to be exclusive.

Although specific embodiments of the invention have been illustrated and described herein, those of ordinary skill in the art will appreciate that any arrangement configured to achieve the same purpose may be substituted for the specific embodiments shown. This disclosure is intended to cover any and all adaptations or variations of various embodiments of the invention. It is to be understood that the above description has been made in an illustrative fashion, and not a restrictive one. Combinations of the above embodiments, and other embodiments not specifically described herein will be apparent to those of skill in the art upon reviewing the above description. The scope of various embodiments of the invention includes any other applications in which the above structures and methods are used. Some aspects of the invention are listed in the following paragraph.

We claim:

1. A network comprising:

a. a computer; and

b. a computerized sensor;

wherein the computerized sensor is protected within concrete or steel components of a physical security barrier and is communicatively connected to the computer and configured to communicate messages containing sensor data to the computer;

wherein paths, channels, and/or other communications technologies used to link the computerized sensor to the computer are switched automatically and autonomously by the computerized sensor; and

wherein at least some of the messages are sent by the computerized sensor at pseudo-randomly selected times known in advance by both the computer and the computerized sensor.

2. The network of claim **1**, further comprising: multiple communications media;

wherein each of the messages is communicated from the computerized sensor to the computer over two or more of the communications media; and

wherein not all of the messages are communicated from the computerized sensor to the computer over the same two or more communications media.

3. The network of claim **1**, further comprising:

a. multiple digital-communications media; and

b. an interlinked chain of concrete barrier modules, wherein each module comprises a hole through that module, and wherein each module comprises a steel beam that extends movably through the respective hole of that module;

wherein the steel beam of at least one of the modules is rotatable coupled to a respective steel beam of each of two adjacent modules that are located next to the at least one of the modules; and

wherein at least one of the multiple digital-communications media is routed along a path extending through at least the respective holes of the at least one of the modules and the two adjacent modules.

4. The network of claim **3**, wherein the computerized sensor is a continuity sensor configured to sense a physical breach of the chain of concrete barrier modules; and wherein the computerized sensor comprises at least a portion of the at least one of the digital-communications media that is routed through the respective holes of the at least one of the modules and the two adjacent modules.

5. The network of claim **1**, further comprising: multiple communications paths;

wherein each of the messages is communicated from the computerized sensor to the computer over two or more of the communications paths; and

wherein not all of the messages are communicated from the computerized sensor to the computer over the same two or more of the communications paths.

6. The network of claim **1**, further comprising: multiple communications channels;

wherein each of the messages is communicated from the computerized sensor to the computer over two or more of the communications channels; and

wherein not all of the messages are communicated from the computerized sensor to the computer over the same two or more of the communications channels.

7. The network of claim **1**, further comprising: multiple communications technologies.

8. The network of claim **1**, further comprising: multiple communications link technologies.

9. The network of claim **1**, further comprising: multiple communications protocols.

10. The network of claim **1**, further comprising: multiple communications technology attributes each with one selected from the group consisting of multiple communications media, multiple communications paths, multiple communications channels, multiple communications technologies, multiple communications link technologies, and multiple communications protocols.

11. The network of claim **1**, wherein the computerized sensor and computer that are communicatively connected for communicating messages containing sensor data are communicatively connected by means of multiple networks some of which do not share any communications paths with one-another.

12. The network of claim **1**, wherein the computer is one selected from the group consisting of a linked concentrator, a sensor server, a network node, a router, an alarm server, a monitor-and-control subsystem, a network operations center, and a tactical operations center.

13. The network of claim **1**, wherein communications from the computerized sensor to the computer begin at times known in advance by the computer.

14. A network comprising:

a. a computer; and

b. a computerized sensor;

wherein the computerized sensor is protected within concrete or steel components of a physical security barrier and is communicatively connected to the computer and configured to communicate messages containing sensor data from the computerized sensor to the computer over one or more provisioned channels, paths, and/or communications technologies selected automatically and randomly by the computerized sensor; and

wherein the computerized sensor initiates messages at randomly selected times known in advance by both the computer and the computerized sensor.

15. The network of claim **14**, further comprising: multiple communications media;

wherein each of the messages is communicated from the computerized sensor to the computer over two or more of the communications media; and

wherein not all of the messages are communicated from the computerized sensor to the computer over the same two or more of the communications media.

16. The network of claim **14**, further comprising:

a. multiple digital-communications media; and

b. an interlinked chain of concrete barrier modules, wherein each module comprises a hole through that module, and wherein each module comprises a steel beam that extends movably through the respective hole of that module;

wherein the steel beam of at least one of the modules is rotatably coupled to a respective steel beam of each of two adjacent modules that are located next to the at least one of the modules; and

wherein at least one of the multiple digital-communications media is routed along a path extending through at least the respective holes of the at least one of the modules and its two adjacent modules.

17. The network of claim **16**, wherein the computerized sensor is a continuity sensor configured to sense a physical breach of the chain of concrete barrier modules; and wherein the computerized sensor comprises at least a portion of the at least one of the digital-communications media that is routed through the respective holes of the at least one of the modules and the two adjacent modules.

18. The network of claim **14**, further comprising: multiple communications paths;

wherein each of the messages is communicated from the computerized sensor to the computer over two or more of the communications paths; and wherein not all of the messages are communicated from the computerized sensor to the computer over the same two or more of the communications paths.

19. The network of claim **14**, further comprising: multiple communications channels;

wherein each of the messages is communicated from the computerized sensor to the computer over two or more of the communications channels; and

wherein not all of the messages are communicated from the computerized sensor to the computer over the same two or more of the communications channels.

20. The network of claim **14**, further comprising: multiple communications technologies.

21. The network of claim **14**, further comprising: multiple communications link technologies.

22. The network of claim **14**, further comprising: multiple communications protocols.

23. The network of claim **14**, further comprising: multiple communications technology attributes each with one selected from the group consisting of multiple communications media, multiple communications paths, multiple communications channels, multiple communications technologies, multiple communications link technologies, and multiple communications protocols.

24. The network of claim **14**, wherein the computerized sensor and computer that are communicatively connected for communicating messages containing sensor data are communicatively connected by means of multiple networks some of which do not share any communications paths with one-another.

25. The network of claim **14**, wherein the computer is one selected from the group consisting of a linked concentrator, a sensor server, a network node, a router, an alarm server, a monitor-and-control subsystem, a network operations center, and a tactical operations center.

26. The network of claim **14**, wherein communications from the computerized sensor to the computer begin at times known in advance by the computer.

27. A method of providing security comprising the steps of:

a. providing:

i. multiple digital-communications media; and

ii. an interlinked chain of concrete barrier modules, wherein each module comprises a hole through that module, and wherein each module comprises a steel beam that extends movably through the respective hole of that module;

wherein the steel beam of at least one of the modules is rotatably coupled to a respective steel beam of each of two adjacent modules that are located next to the at least one of the modules;

wherein at least one of the multiple digital-communications media is routed along a path extending through at least the respective holes of the at least one of the modules and the two adjacent modules;

wherein the at least one of the multiple digital-communications media connects a computerized sensor to a computer installed within one of the holes and messages containing sensor data are communicated from the computerized sensor to the computer over one or more provisioned channels, paths, and/or communications technologies of the multiple digital-communications media selected automatically and randomly by the computerized sensor;

wherein the computerized sensor initiates the communication of messages at randomly selected times known in advance by both the computer and the computerized sensor; and

b. generating a breach alarm when communication of messages along the path becomes disabled.

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